11-1520-240-34

TM 11-1520-240-34

AVIATION INTERMEDIATE MAINTENANCE MANUAL
ELECTRONIC EQUIPMENT CONFIGURATIONS
ARMY MODEL CH-47D

(NSN 1520-01-088-3669)

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY

30 APRIL 1983

READEX FICHE best copy available

D 101.11:

WARNING

DANGEROUS VOLTAGES EXIST IN THESE CONFIGURATIONS

Be careful when working on the 115-volt ac output circuits.

DEATH ON CONTACT

Can result if safety precautions are not observed. Be careful not to come in contact with high-voltage connections when servicing this equipment. Voltages as high as 1,200-volt dc are present in these configurations, and 200-volt 400-cycle, 3-phase ac is present on the helicopter generator feeders.

RF BURNS

Do not touch or stand close to radiating antennas. Serious burns can result.

TM 11-1520-240-34
C 2

Change

No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 January 1987

TECHNICAL MANUAL
AVIATION INTERMEDIATE MAINTENANCE MANUAL
ELECTRONIC EQUIPMENT CONFIGURATION
ARMY MODEL CH-47D HELICOPTER
(NSN 1520-01-088-3669)

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3-27 and 3-28	3-27 and 3-28
4-3 through 4-10	4-3 through 4-10
Index 3 and Index 4	Index 3 and Index 4
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No. 1

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TECHNICAL MANUAL
AVIATION INTERMEDIATE MAINTENANCE MANUAL
ELECTRONIC EQUIPMENT CONFIGURATIONS
ARMY MODEL CH-47D
(NSN 1520-01-088-3669)

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2-5 and 2-6	2-5 and 2-6
2-9 through 2-12	2-9 through 2-12
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4-3 and 4-4	4-3 through 4-7/(4-8 blank)
Index 3 through Index 5/ (Index 6 blank)	Index 3 through Index 5/ (Index 6 blank)
FO-3/(FO-4 blank)	FO-3/(FO-4 blank)
FO-5/(FO-6 blank)	FO-5/(FO-6 blank)
FO-7/(FO-8 blank)	FO-7/(FO-8 blank)
FO-15/(FO-16 blank)	FO-15/(FO-16 blank)
FO-33/(FO-34 blank)	FO-33/(FO-34 blank)
FO-35/(FO-36 blank)	FO-35/(FO-36 blank)
FO-39/(FO-40 blank)	FO-39/(FO-40 blank)
FO-41/(FO-42 blank)	FO-41/(FO-42 blank)
FO-45/(FO-46 blank)	FO-45/(FO-46 blank)
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HEADQUARTERS
DEPARTMENT OF THE ARMY
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AVIATION INTERMEDIATE MAINTENANCE MANUAL ELECTRONIC EQUIPMENT CONFIGURATION ARMY MODEL CH-47D HELICOPTERS (NSN 1520-01-088-3669)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5000. A reply will be furnished to you.

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5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL
2. IF POSSIBLE TURN OFF THE ELECTRICAL POWER
3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL
4. SEND FOR HELP AS SOON AS POSSIBLE
5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING

DANGEROUS CHEMICALS ARE USED IN NICKEL-CADMIUM BATTERIES

WARNING

Potassium hydroxide is extremely toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Cleaning compound (Trichlorotrifluoroethane) can form toxic vapors if exposed to flame. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CHAPTER 1
INTRODUCTION

1-1. Scope.

a. This manual covers Aviation Intermediate Maintenance (AVIM) of the electronic equipment configuration for CH-47D (Chinook) helicopters. It includes instructions appropriate to maintenance personnel for troubleshooting electronic equipment when the equipment is installed in the helicopter. This manual lists tools, test equipment, and materials required by maintenance personnel to maintain the electronic equipment configuration.

b. Bench maintenance of many of the electronic equipment configuration components is covered in other manuals. The pertinent manuals for these electronic equipments are listed in the appendix. When you service electronic equipments, refer to those manuals for detailed troubleshooting, testing, aligning, and repair procedures, and for replacing or repairing maintenance parts.

c. Block diagram analyses of the entire electronic equipment configuration and the individual facilities that are part of it are covered in TM 11-1520-240-20. Differences in configurations, preventive maintenance checklists, limited troubleshooting, and wiring diagrams are also included in TM 11-1520-240-20.

d. Analysis of the electronic configuration interunit circuits is covered in Chapter 2 of this manual. AVIM troubleshooting is covered in Chapter 3, with maintenance instructions in Chapter 4. For electronic equipments covered by separate manuals, refer to the pertinent manual (appx A) for detailed circuit analysis, troubleshooting and repairs.

e. The addition of an asterisk in parentheses to the official nomenclature is used to indicate all models of the equipment discussed in this manual. TM 11-1520-240-20 lists the equipment to which this symbol will apply.

1-1.1 Reporting Equipment Improvement Recommendations (EIR). If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronic Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey, 07703. We will send a reply.

NOTE

For applicable forms and records, see TM 11-1520-240-20.

1-2. Consolidated Index of Army Publications and Blank Forms.

Refer to the latest issue of DA PAM 310-1 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-3. Electronic Configuration.

The facilities in the configuration covered by this manual are in the chart below. For detailed electronic equipment breakdown of each facility and associated configurations, refer to TM 11-1520-240-20.

FACILITY	EQUIPMENT
Interphone System	Control, Interphone C-6533/ARC (Six installed)
VHF AM/FM	Radio set AN/ARC-186 (2)
UHF AM	Radio set AN/ARC-164
HF	Radio set AN/ARC-102 (CPO)
ADF	Direction finder set AN/ARN-89B
VOR/ILS	Radio receiving set AN/ARN-123
Doppler	Navigation set AN/ASN-128
Compass	Gyromagnetic compass set AN/ASN-43
VGI	Attitude indicating ARU-12/A
HSI	Horizontal situation indicator ID-2103/A
Radar Altimeter	Altimeter set, electronics AN/APN-209
IFF	Transponder set AN/APX-100
Radar Warning	Detecting set, radar signal AN/APR-39 (CPO)
Counter-measures	Countermeasures set AN/ALQ-156 (CPO)

CHAPTER 2
FUNCTIONING OF ELECTRONIC FACILITIES

SECTION I CONFIGURATION INTERUNIT CIRCUIT ANALYSIS

2-1. Introduction to Functioning Discussions.

The purpose and operation of the various circuits in this electronic equipment configuration are explained in this chapter. You will find additional information on internal details of electronic equipments in the technical manual for the equipment (appx A). Familiarity with interunit circuits, and how they work, will help you in troubleshooting the electronic equipment configuration. Where applicable, the following types of circuits are covered:

a. Power and control circuits

b. Audio output circuits

c. Indicating circuits

2-2. Service Diagrams

The interunit analyses are supported by service diagrams which include details of interunit wiring in addition to pertinent details of the internal circuits of electronic equipments. The diagrams combine schematic presentation for ease of understanding with the wiring details required for practical troubleshooting. On all diagrams, wire shields are omitted for clarity. For details of shielding refer to the wiring diagrams in TM 11-1520-240-20. Foldout (FO-) service diagrams are in the rear of the manual. Refer to FO-1 thru FO-31

SECTION II INTERPHONE FACILITY INTERUNIT CIRCUIT ANALYSIS

2-3. Interphone Facility, General.

The interphone facility includes switching, headset-microphones, and amplifiers for headset and microphone audio. The headset and microphone amplifiers are included in Intercommunication Set Control C-6533/ARC (COMM CONT). The headsets have 4.8-ohm microphone and 8-ohm headset circuits, matching the impedance of the associated amplifier circuits. The headset amplifier of each C-6533/ARC is operative when dc power is on. The microphone amplifier operates when the control circuit is completed by the associated p/t or private interphone circuit.

a. Each pilot's position is equipped with a TRIGGER switch on the control stick and a foot-operated switch. These switches control relays in the p/t and tr circuits to complete the microphone amplifier output circuit. The TRIGGER switch controls the interphone and communication transmitter circuits. The foot switch controls the tr circuits of the communication transmitters. Audio threshold device MD-1047/A includes microphone filters and keying interlock relay circuits. The microphone filter circuits provide cross-talk filtering for modulating audio enroute to the hf, vhf, and uhf radio sets. The keying interlock relay circuits prevent retransmission of secure voice vhf fm receiver audio. Power (28-volt dc) is applied to the four relays in the device only when communication security set TSEC/KY-28/KY-58 is operated in X (secure voice) mode.

b. The transmitter selector switches of the gunner's and aft controls C-6533/ARC are not connected to communication transmitters. The p/t circuits of these controls and the extensions of the aft control at the hoist, ramp, and exterior stations also complete the microphone amplifier output circuit in a way which bypasses these switches. In addition to the spring-loaded PRESS-TO-TALK switch on the hoist operator's grip, the hoist operator has a panel-mounted HOT MIKE switch with a locking position for hands-free hot-mike operation. The aft station has access to all receiver audio.

c. Left and right gunners interphone stations are at sta. 130. Each station has a C-6533/ARC, and a p/t switch. Each position also has a foot switch in parallel with the p/t switch. Gunners' stations are not equipped for private communication but have access to communication receiver audio.

d. The audio output of each microphone amplifier is connected to the audio input circuits of all headset amplifiers thru the interphone junction box circuits and the COMM CONT switches or the ICS position of the selector switch of the C-6533/ARC. For details of the internal circuits of Intercommunication Set Control C-6533/ARC, refer to TM 11-5821-262-35.

2-4. Interphone Facility Power and Control Circuits.

a. Power and Control Circuits. Copilot and left gunner stations (fig. FO-2, sheet 1 of 2).

(1) Twenty-eight-volt dc from No. 1 essential bus in No. 1 pdp is routed thru INTPH LH circuit breaker 187CB1, pin 24 on 300P2, pin 14 on 300P58, to pin 4C on TB4. From pin 4A on TB4 the voltage is routed to pin S on 187P26 of the copilot's C-6533/ARC. Twenty-eight-volts dc from INTPH LH circuit breaker 187CB1 is also routed thru pin 22 on 300P3, pin 48 on 300P48, to pin U and S on 187P10 of the left gunners C-6533/ARC.

(2) Interphone keying is accomplished by applying ground potential to microphone amplifier AR1 in the C-6533/ARC. In the C-6533/ARC, pins M and K are at ground potential. Pin K is connected to the copilot's p/t switch. When the switch is closed, ground potential is connected to pin B or E on the C-6533/ARC. At the copilot's station, the p/t switches include a foot operated switch and a control stick grip TRIGGER switch. Stepping on the foot switch or holding the TRIGGER switch to 2ND POS RADIO connects pin K (ground) on the C-6533/ARC to pin B thru the switch and the interphone junction box. With C-6533/ARC selector switch S1 at ICS, ground potential is routed thru selector switch S1B contacts 8 and 2 and the HOT MIKE switch (at OFF) to microphone amplifier AR1. This activates the amplifier and allows the copilot to talk on the interphone system. Holding the TRIGGER switch at 1ST POS INTERPHONE connects ground potential from pin K to pin E on the C-6533/ARC. From pin E, ground potential is applied to the microphone amplifier by passing the selector switch. This circuit permits interphone operation with the selector switch at any position.

(3) Transmitter keying is provided with the C-6533/ARC selector switch at 1, 2, 3, or 4 (5 is not connected). Stepping on a foot switch or holding the TRIGGER switch to 2ND POS RADIO connects ground potential at pin K to pin B on the C-6533/ARC. The circuit continues thru contacts 8 and 2 of switch S1B to the control side of Xmit relay K1 and to microphone amplifier AR1, energizing both components. When Xmit relay K1 is energized, its contacts switch microphone amplifier output from the interphone transmit line to the radio transmit line thru switch S1A. From relay contact K1-6, the control path continues thru switch S1A contacts 7 and 1, 2, 3, or 4 to the radio keying lines. (Refer to the appropriate radio system power and control circuit description for details of the radio keying circuits.)

b. Power and Control Circuits. Pilot, troop commander, right gunner and aft stations (fig. FO-2, sheet 2 of 2).

(1) Twenty-eight-volt dc from the No. 2 essential bus in No. 2 pdp is routed thru INTPH RH circuit breaker 187CB2, pin 18 on 300P6, pin 18 on 300P11 to pin 6D on TB4. From pin 6B on TB4, 28-volts dc is routed to pin S on 187P27 at pilot's C-6533/ARC. From pin 6A on TB4, 28-volts dc is routed to pin S on 187P30 at the troop commanders C-6533/ARC. Twenty-eight-volt dc from INTPH RH circuit breaker 187CB2 is also routed thru pin 43 on 300P8, pin 61 on 300P45 to pins U and S on 187P13 at the right gunners C-6533/ARC and thru pin 25 on 300P7, pin 25 on 300P48 to pins U and S on 187P31 at the aft C-6533/ARC.

(2) Control of the interphone and radio transmit circuits for the pilot and troop commander is accomplished in the same way as the copilot's circuit (a above).

(3) The aft C-6533/ARC serves a ramp operator's position, two hoist operator's position and two external (forward and aft) positions. All have interphone cords equipped with headset-microphone p/t switches. The hoist operator has a p/t switch on his hoist control grip, a HOT MIKE switch on his switch panel and an alternate receptacle for connecting a p/t switch. The forward and aft external stations have jacks for connecting walking cords. The walking cord has an integral p/t switch.

(4) Each station's keying line from the p/t switch to the aft C-6533/ARC is routed thru pins on TB29. In addition, the keying lines from the hoist and the two external stations are routed thru pins on TB27. When the ramp operator presses his p/t switch, he connects ground from pin K to pin E on 187P31 at the aft C-6533/ARC. This path from pin K is routed thru pins 2G and 2H on TB29, the p/t switch, and pins 2E and 2D on TB29 to pin E on 187P31 at the aft C-6533/ARC.

(5) The hoist operator, using the p/t switch or HOT MIKE switch on the hoist switch panel, has the same control functions as the ramp operator above. The control path from pin K (ground) on 187P31 is routed thru pins 2G and 2J on TB29, pins 7B and 7J on TB27, the p/t or the HOT MIKE switch, pins 7C and 7K on TB27, pins 2F and 2D on TB29 to pin E on 187P31 at the aft C-6533/ARC.

(6) When the p/t switch at either external station is pressed, ground from pin K is connected to pin E on connector 187P31 of the aft C-6533/ARC. The control path from pin K on 187P31 is routed thru pins 2G and 2J on TB29, pins 7G -M and 7G -H on TB27, either p/t switch, pins 7D -A and 7E -A on TB27, pins 2F and 2D on TB29 to pin E on 187P31 at the aft C-6533/ARC. At any position of the selector switch the external station can transmit on the interphone system. Since his p/t switch is not connected to pin B of the C-6533/ARC, he cannot transmit on any radio set.

2-5. Interphone Facility Audio Circuits (fig. FO-3).

a. The interphone audio circuits amplify and distribute microphone and headset audio thru the interphone system. Microphone audio, originating at one of the interphone stations, is amplified in the communication control C-6533/ARC. If ICS operation, is selected, audio is connected to a common audio line in the interphone junction box and distributed as headset audio to all other interphone stations. If radio operation is selected audio is connected to the microphone audio line for the selected radio set. Headset audio arriving at one interphone station from another station or from a radio receiver is amplified in the receiving station's C-6533/ARC. The audio is then routed on to the crewmember's head set. Details of the copilot's audio circuits are described. Except for wire identification, other station's circuits are almost identical. Differences are noted when they are significant.

b. Microphone audio circuits. When a crewmember selects ICS operation and presses his p/t switch, he can talk to the crewmember at any other interphone station. When the copilot presses his foot switch or control stick grip switch and speaks into his microphone, audio is routed to his C-6533/ARC thru pins A and C on connector 187P26. Microphone amplifier AR1, turned on by the copilot's p/t switch, amplifies the audio. The amplified audio is routed thru contacts 5 and 7 of deenergized relay K1 and splits into two paths. One path is a sidetone path thru the VOL control and headset amplifier AR2 to the copilot's headset. The other path is the main audio path thru pin DD on 187P26 at the C-6533/ARC to pin 10 on 187P1 of the interphone junction box. The audio in the interphone junction box joins the common interphone audio line connected to five other C-6533/ARC thru pins 10 or 2 of the connectors at the junction box. The microphone audio circuits from the aft C-6533/ARC also includes circuits from the forward and aft external stations and the hoist operator's station. Circuits from these stations are routed thru terminal board TB27 to TB29, where they join the circuit from the station. The circuit continues to the aft C-6533/ARC. The remainder of the circuit is identical with the copilot's.

c. Headset audio. Regardless of the position of the selector switch on his C-6533/ARC, any crewmember can listen to interphone audio from any other interphone station. Audio from one of the other stations comes to the copilot's station from the common audio line in the interphone junction box thru pin 10 on 187P1, thru pin DD on 187P26 of the C-6533/ARC. There it follows the sidetone audio path thru the VOL control, headset amplifier AR2, pins TT and XX on 187P26, pins D and E on 187P32, and pins 2 and 4 on 187P33, to the copilot's headset. At the output of the aft C-6533/ARC, the audio goes to TB29 where it is split into two paths. One path is to the aft station headset. The other path is to TB27 where it splits again, this time into four branches: One branch runs to the aft external station, two to the forward external stations and one to the hoist operator's station.

SECTION III NO. 1 VHF AM/FM COMMUNICATION, SECURITY AND HOMING FACILITY

2-6. No. 1 VHF AM/FM Radio Set AN/ARC-186.

The AN/ARC-186 circuits covered by description and service diagrams include dc power distribution tr control, receiver audio, homing and secure voice paths.

2-7. No. 1 AN/ARC-186 Power and Control Circuits

(fig. FO-4).

a. Dc power for the operation of receiver-transmitter RT-1354/ARC-186 is routed from the 27-volt dc No. 2 primary bus. The circuit runs thru 7-ampere VHF No. 1 AM/FM circuit breaker 182CB2, pin 17 on 300P6 pin 29 on 300P11, and pin D on 182P4 at receiver-transmitter RT-1354/ARC-186. Dc power for the operation of the communication security set is routed from the 28-volt dc No. 2 primary bus. This circuit runs thru 5-ampere KY-28 circuit breaker 182CB4, pin 29 on 300P6, pin 31 on 300P11, pins 5C and 5D on TB6, to pin A on 182P19 at control C-8157/ARC. The voltage is routed from the C-8157/ARC thru pin B on 182P19, pins 4A and 4C on TB7, and pin 18 on 300P16, to pin J on 182P18 at the TSEC/KY-28. The 28-volt dc from current breaker 182CB4 is also supplied to the cipher lights for press-to-test operation. With one side of the light connected to ground, closing the press-to-test switch connects 28-volt dc from pin 3 and lights the lamps. Dc power for homing operation is routed from the 28-volt dc No. 2 primary bus thru 5-ampere VHF HOM circuit breaker 182CB3. The circuit runs thru pin 31 on 300P7 to pin D on 182P20 at signal data comparator CM-492/ARC-186.

b. Transmit control can be accomplished (pilot, copilot and troop commander only) by closing the push-to-talk switch, the pilot's or copilot's foot switch, or the switch on either pilot's control stick grip. Closing any one of the switches places a ground at pin B on 187P26, 187P27 or 187P30 of the appropriate control C-6533/ARC. The ground from the radio push-to-talk switch is connected thru pin B on 187P27 of the pilot's C-6533/ARC to selector switch S1. With the switch at 1, the ground is connected thru pin X on 187P27 to pin 16 on 187P2 at the interphone junction box. In the interphone junction box, pin 16 on 187P2 is connected to a tiepoint common to pins 16 of 187P1 and 187P5, the key control lines from the copilot and troop commander station respectively. This tiepoint is connected thru pin 27 on 187P8 at the interphone junction box, pin 9 on 300P12 to the transmit control circuit thru pin h on 182P4 at receiver-transmitter RT-1354/ARC-186. The ground is also routed thru pin M on 182P18 of communication security set TSEC/KY-28, thru the TSEC/KY-28 for microphone and receiver audio enciphering and deciphering. Cipher operation is enabled by setting the CIPHER/PLAIN switch on control C-8157/ARC to CIPHER.

receiver audio enciphering and deciphering. Cipher operation is enabled by setting the CIPHER/PLAIN switch on control C-8157/ARC to CIPHER.

c. The homing enable signal is routed thru pin R on connector 182P4 of receiver-transmitter RT-1354/ARC-186, to the flag and steering circuits, thru pin R on connector 182P16 of signal data comparator CM-492/ARC-186. The flag and steering signals are routed out thru pins A, U, and T on connector 182P20 to the pilot and copilot mode select panels and horizontal situation indicators.

2-8. No. 1 AN/ARC-186 Audio Circuits (fig. FO-5).

NOTE

> Only the pilot's audio circuits are discussed. Operation from other interphone stations is similar.

a. Headset audio from radio set AN/ARC-186, secured or clear language, is routed thru communication security set TSEC/KY-28, audio threshold device MD-1047/A and the interphone junction box. Secured audio is deciphered in TSEC/KY-28 before going to the MD-1047/A and interphone junction box. In the MD-1047/A the audio circuit is open when the hf, uhf or vhf transmitter is keyed. This ensures that secured audio will not be retransmitted. The radio set can be selected for transmission (pilot, copilot and troop commander only) and reception at C-6533/ARC by setting the C-6533/ARC selector switch at 1. Receiver audio can be monitored at any C-6533/ARC with selector switch at any position by setting receiver switch to No. 1 ON.

b. Receiver audio from pin d on 182P4 at receiver-transmitter RT-1354/ARC-186 is routed thru pin 4E and 4F of TB7, and pin 13 on 300P12 to pin G on 182P18 at the KY-28. When the KY-28 is not installed a jumper is installed between pin G on 182P18 to pin F on 182P17. The signal from pin F on 182P17 is routed to pin A on 188P2 of the MD-1047/A. In the MD-1047/A the signal is routed thru normally closed contacts of relays K1, K2, K3, and K4. Audio from K1, K2, and K3, and pins f, T, and V on 188P2 is fed to the pilots, copilots and troop commanders C-6533/ARC. The signal from relay K4 is routed thru pin U on 188P2 at the MD-1047/A, pins 9G and 9H on TB52 to pin 5 on 187P34 at the interphone junction box. The interphone junction box provides common tie points for signal distribution to the aft, right gunner, and left gunner C-6533/ARC. The pilot's audio signal from pin f on connector 188P2, is routed thru pins 9A and 9B, on TB52 to pin KK on 187P27 of the C-6533/ARC. With switch S1 at ON, headset audio from pin KK is connected thru VOL control R34 to headset amplifier AR2 and pins XX and TT on 187P27 of the C-6533/ARC to the headset.

c. Microphone audio from pins A and C on 187P27 at the pilot's C-6533/ARC is connected to transformer T1, to microphone amplifier AR1 where it is amplified to modulate the transmitter. The amplified audio from transformer T2 is routed thru closed contacts of transmit relay K1, to level adjust resistor R29. With selector switch S1A at 1, audio is routed thru pin V on 187P27 of the pilot's C-6533/ARC, pin 7 and 1 on 187P35 of the interphone junction box, and pins 7A and 7B on TB52, to pin b on 188P1 at the MD-1047/A. The transformer networks in the MD-1047/A couple radio transmit audio signals which prevents cross-talk. The audio signal from pin R on 188P1 of the MD-1047/A is routed thru pin A on 182P17 at the KY-28. When the KY-28 is not installed, a jumper wire is connected from pin A on 182P17 to pin V on 182P18. The signal is routed thru pin V on 182P18, pin 24 on 300P13 and pin K on 182P4 at receiver-transmitter RT-1354/ARC-186, to the microphone circuits.

SECTION IV NO. 2 VHF AM/FM FACILITY

2-9. No. 2 VHF AM/FM Radio Set AN/ARC-186.

The AN/ARC-186 circuits covered by descriptions and service diagrams include dc power distribution, ON-OFF and tr control and receiver audio paths.

2-10. No. 2 AN/ARC-186 Power and Control Circuits (fig. FO-6).

a. Dc power from the 28-volt dc primary bus is connected thru the 7-ampere VHF NO. 2 AM FM circuit breaker 182CB1, pin 36 on 300P2 and pin 35 on 300P58, to pin D on 182P1 at receiver-transmitter RT-1354/ARC-186. Power return is routed from pin E on 182P1 to ground.

b. The ground from the radio p/t switch is connected thru pin B on 187P26 at the copilot's C-6533/ARC to selector switch S1. With the switch at 3, the ground is routed thru pin N on 187P26 at the C-6533/ARC, pin 24 on 187P1, thru the interphone junction box and pin 21 on 187P8 to pin Z on 188P2 at the MD-1047/A. During secure voice operation, the relay circuits in the MD-1047/A ensure cross-talk isolation by disconnecting secure voice audio from the interphone station which is keying a nonsecure radio facility. From pin E on 188P2 at the MD-1047/A, the ground is routed thru pin 40 on 300P12, to the transmit key circuits thru pin h on 182P1 at receiver-transmitter RT-1354/ARC-186.

2-11. No. 2 AN/ARC-186 Audio Circuits (fig. FO-7).

NOTE

> Only the pilot's audio circuits are discussed. Operation from other interphone stations are similar.

a. Headset audio from vhf am/fm radio set RT-1354/ARC-186 is connected thru the interphone junction box to the C-6533/ARC communication control. The interphone junction box provides common tie points to permit signal distribution to any C-6533/ARC that has selected the vhf am/fm radio set. The radio set can be selected for transmission (pilot and copilot only) and reception at the C-6533/ARC by setting the selector switch to 3. Receiver audio can be monitored at any C-6533/ARC with the selector switch at any position by setting receiver switch 3 to ON.

b. Receiver audio from pin d on 182P1 at receiver-transmitter RT-1354/ARC-186 is routed thru pin 45 on 300P13 to pin 9 on 187P7 at the interphone junction box. The interphone junction box provides a common tie point to permit signal distribution to any C-6533/ARC. The audio is routed out of the interphone junction box thru pin 22 on 187P2 to pin PP on 187P27 at the pilot's C-6533/ARC. With switch S3 at ON, headset audio from pin PP is connected to the headset thru VOL control R34 to headset amplifier AR2 and pin XX and TT on 187P27 at the C-6533/ARC.

c. Microphone audio is connected to transformer T1 thru pins A and C on 187P27 at the pilot's C-6533/ARC. The audio is coupled across transformer T1 to microphone amplifier AR1 where it is amplified to modulate the transmitter. The amplified audio is coupled across transformer T2 and thru the closed contacts of transmit relay K1, to level adjust resistor R29. With selector switch S1A at 3, audio is routed thru pin L on 187P27 at the pilot's C-6533/ARC, pin 49 on 187P2 at the interphone junction box, and pin 5 on 187P8 at the interphone junction box to pin C on 188P1 at the MD-1047/A. The MD-1047/A minimizes crosstalk. The audio signal from pin G on 188P1 at the MD-1047/A is routed thru pin 38 on 300P12, and pin K on 182P1 at receiver-transmitter RT-1354/ARC-186 to the receiver-transmitter microphone circuits.

SECTION V UHF COMMAND FACILITY

2-12. UHF Radio Set AN/ARC-164.

The AN/ARC-164 circuits covered by descriptions and service diagrams include ac and dc power distribution, ON-OFF, tr control, function select circuits and receiver audio paths.

2-13. AN/ARC-164 Power and Control Circuits (fig. FO-8).

a. Dc power from the 28-volt dc No. 1 essential bus is connected thru the 5-ampere UHF AM circuit breaker 181CB1, pin 16 on 300P2, pin 19 on 300P58 to pin D on 181P1 at receiver-transmitter RT-1167/ARC-164. From pin D on 181P1, 28-volts dc is routed thru 5-ampere fuse F1 to the power supply circuits in the transmitter section. The power supply develops all operating voltages.

b. Panel light voltages are obtained from the 26-volt ac No. 1 lighting bus. The voltage is routed thru 5-ampere CONSOLE circuit breaker 124CB1, pin 19 on 300P1, pin 19 on 300P19 to the CONSOLE LTS control. From the control, the voltage is routed thru pin 26 on 300P23, pin 22 on 300P17, pin 1A and 2B on TB4, pin C on 181P1 to the RT-1167/ARC-164 panel lights.

c. The ground from the radio p/t switch is connected thru pin B on 187P26 of the copilot's C-6533/ARC to selector switch S1. With the switch at 2, the ground is routed thru pin T on 187P26 of the C-6533/ARC, pin 20 on 187P1, thru the interphone junction box to pin 20 on connector 187P8 to pin Y on 188P2 at the MD-1047/A. During voice security operation, the relay circuits in the audio threshold device ensure adequate cross-talk isolation by disconnecting secure voice audio from the interphone station which is keying a nonsecure radio facility. From pin G on 188P2 of the MD-1047/A, the ground is routed to the transmit key circuits thru pin 22 on 300P10 and pin h on connector 181P1 at receiver-transmitter RT-1167/ARC-164.

2-14. AN/ARC-164 Audio Circuits (fig. FO-9).

NOTE

> Only the pilot's audio circuits are discussed. The operation of other interphone stations is similar.

a. Headset audio from uhf radio set RT-1167/ARC-164 is connected thru the interphone junction box to the C-6533/ARC communication control. The interphone junction box provides common tie points to permit signal distribution to any C-6533/ARC that has selected the uhf am radio set. The radio set can be selected for transmission (pilot and copilot only) and reception at C-6533/ARC by setting the C-6533/ARC selector switch at 2. Receiver audio can be monitored at any C-6533/ARC with the selector switch at any position by setting the receiver switch 2 to ON.

b. Receiver audio from pin d on 181P1 at receiver-transmitter RT-1167/ARC-164 is routed thru pin 6 on 300P12 to pin 6 on 187P7 at the interphone junction box. The interphone junction box provides a common tie point to permit signal distribution to any C-6533/ARC. The audio is routed from the interphone junction box thru pin 18 on 187P2 to pin SS on 187P27 at the pilot's C-6533/ARC. With receiver switch 2 at ON, headset audio from pin SS is connected thru VOL control R34 to headset amplifier AR2 and pin XX and TT on 187P27 at the C-6533/ARC, to the headset.

c. Microphone audio is connected to transformer T1 thru pins A and C on 187P27 at the C-6533/ARC. The audio is coupled across transformer T1 to AR1 microphone amplifier where it is amplified to modulate the transmitter. The amplified audio is coupled across transformer T2 and thru closed contacts of transmit relay K1 to level adjust resistor R29. With selector switch S1A at 2, audio is routed thru pin R on 187P27 at the pilot's C-6533/ARC, pin 46 on 187P2, pin 3 on 187P8 at the interphone junction box to pin E on 188P1 at the MD-1047/A. The MD-1047/A minimizes crosstalk. The audio signal from pin A on connector 188P1 of the MD-1047/A is routed thru pin 9 on 300P13 and pin L on 181P1 at receiver-transmitter RT-1167/ARC-164 to the receiver-transmitter microphone circuits.

SECTION VI HF LIAISON FACILITY

2-15. HF Radio Set AN/ARC-102.

The AN/ARC-102 circuits covered by descriptions and service diagrams include ac and dc power distribution, on-off, tr control, and function select circuits. Receiver audio and sidetone paths to the pilot's, troop commander, ramp, and gunners are included.

2-16. AN/ARC-102 and CU-1658/ARC Power and Control Circuits

(fig. FO-10).

a. Power circuits.

(1) Twenty-eight-volt dc operation is obtained from the No. 2 dc bus thru HF circuit breaker 184CB2 and HF circuit breaker 184CB3 in No. 2 pdp.

(2) Dc power from circuit breaker 184CB2 is connected to strapped terminals 3, 4, 5, 6, 7, 8, 9, and 10 of 184A3TB2. Seven circuit branches connect dc power to high voltage power supply A8 of RT-698/ARC-102.

(3) Dc power from 184CB3 is routed thru pin 7 of 300P7, pins 2A, 2B, and 2C on TB11, and pins 16 and 4 on 184P3 to normally open contact 3 and one side of the winding of on-off relay K1 in RT-698/ARC-102.

(4) One-hundred and fifteen volt ac is obtained from No. 2 ac bus thru HF circuit breaker 184CB1 in No. 2 pdp. Ac power is then routed thru pin 6 on 300P7, pins 2D and 2E on TB11, pin 12 on 184P3, thru CR4, R21, and relay K9 to ground, energizing relay K9 in RT-698/ARC-102. Operation of the selector switch on control C-3940/ARC-94 from OFF completes the ground circuit to the control side of the winding of relay K1 thru 7 and 4 contacts of relay K9. Operation of relay K1 connects 115-volts ac thru contacts 5 and 6 of relay K1 to terminal 2 of the thermal winding of time delay relay K7 to normally open contact 14 of keying relay K3, to auto-transformer T1, and to other operating circuits of RT-698/ARC-102. The 115-volt ac is also connected thru pin 11 on 184P3 and pin A on 184P2 at the antenna coupler CU-1658/ARC to transformer T1.

(5) Twenty-eight-volts dc from pin 4 on 184P3 at RT-698/ARC-102 is connected thru contacts 3 and 4 of relay K1 to one side of the winding of keying relay K3, antenna transfer relay K5, the TR, AM/SB, and CW relays, and to other internal circuits of RT-698/ARC-102. In addition, the dc voltage is connected thru pin 56 on 184P3 of RT-698/ARC-102, pin L on 184P2 at the CU-1658/ARC, and contacts of key interlock relays K27 AND K6. When relays K6 and K27 are released, indicating that the CU-1658/ARC is ready to tune, the 28-volt dc is connected thru closed contacts of relays K6 and K27, pin S on 184P2, pin 5 on 184P3 at RT-698/ARC-102 and contacts 1 and 7 of time-delay relay K7 to one side of the windings of plate contactor relay A8K1 and overload relay A8K2.

b. Tr control circuits.

NOTE

Only the troop commander's transmit control circuits are discussed. Operation from other interphone stations is similar.

(1) The ground from the radio p/t switch is connected thru pin E on 187P30 at C-6533/ARC to selector switch S1. With the switch at 4, this ground is routed thru pin J on 187P30 of C-6533/ARC, pin 28 on connector 187P5 thru the interphone junction box to pin 19 on 187P8 to pin K on 188P2 at the MD-1047/A. The tr control from the MD-1047/A continues thru pin 25 on 300P9 to pin m on 184P5 of control C-3940/ARC-94. With switch S5 at USB, LSB, or AM, the tr control circuit continues thru pin q on 184P5, pin 9 on TB13, pin 55 on 184P3 at RT-698/ARC-102, and normally closed contacts 8 and 7 of recycle relay K4, to the control side of the windings of keying relays K2 and K3, antenna transfer relay K5 and other tr relays. Recycle relay K4 prevents the transmitter from being keyed during a tuning cycle. From contact 7 of recycle relay K4, another tr control circuit is completed to the control side of the winding of plate contactor relay A8K1 thru contacts 7 and 6 of overload relay A8K2.

2-17. AN/ARC-102 Audio Circuits

(fig. FO-11).

NOTE

Only the pilot's audio circuits are discussed. Operation of other interphone stations is similar.

a. Headset audio from hf radio set RT-698/ARC-102 is connected thru the interphone junction box to the communication control C-6533/ARC. The interphone junction box provides common tie points to permit signal distribution to any C-6533/ARC that has selected the hf radio set. The radio set can be selected for transmission and reception at C-6533/ARC by setting the selector switch at 4. Receiver audio can be monitored at any C-6533/ARC with the selector switch at any position by setting receiver switch 4 to ON.

b. Receiver audio from pin 58 on 184P3 of the RT-698/ARC-102 is connected to pin 11 on 187P7 at the interphone junction box. The interphone junction box provides a common tie point to permit signal distribution to any C-6533/ARC. The audio from the interphone junction box is routed thru pin 26 on 187P2 to pin MM on 187P27 of the pilot's C-6533/ARC. With receiver 4 toggle switch at ON, headset audio from pin MM is connected thru VOL control R34 to headset amplifier AR2 and pin XX and TT on 187P27 to the headset.

c. Microphone audio is connected to transformer T1 thru pins A and C on 187P27 at the C-6533/ARC. The audio is coupled across T1 to microphone amplifier AR1 where it is amplified to modulate the transmitter. Amplified audio is coupled across transformer T2 and thru closed contacts of transmit relay K1 to level adjust resistor R29. With selector switch S1A at 4, audio is routed thru pin F on 187P27 of C-6533/ARC, pin 52 on 187P2, pin 8 on 187P8 at the interphone junction box to pin N on 188P1 of the MD-1047/A. The MD-1047/A minimizes crosstalk. The audio signal from pin J on 188P1 of the MD-1047/A is connected to pin 37 on 184P3 at RT-698/ARC-102 to the receiver-transmitter microphone circuits.

SECTION VII AUTOMATIC DIRECTION FINDER FACILITY (ADF)

2-18. Direction Finder Set AN/ARN-89B.

The adf circuits covered by descriptions and service diagrams include power and control and audio and rf gain control circuits.

2-19. AN/ARN-89B Power and Control Circuits

(fig. FO-12).

a. Dc power from the 28-volt dc No. 1 dc bus is connected thru 5-ampere ADF circuit breaker 191CB1, pin 30 on 300P4, pins 4K and 4M on TB11, to pin L on 191P1 at Receiver R-1496/ARN-89. The voltage is routed thru the receiver, pin A on 191P2, and pin 1 on 300P16 to pin A on 191P7 at control C-7392A/ARN-89. In the control, 28-volts dc is connected thru fuse F1 to contact 1 of switch S2A front. With switch S2 at any position other than OFF, the voltage from contact 2 is connected thru pin B on 191P7 at the control and pin 2 on 300P16 to pin B on 191P2 at the receiver. From pin B on 191P2, the 28-volt dc is connected to the power supply in the receiver where it is used to develop operating voltages for the adf system.

b. The sense antenna circuit is enabled when function selector switch S2 is at COMP or ANT. Contact 4 of switch S2A rear connects 15-volt dc thru pin M on 191P7 of the control and pin 9 on 300P16 to pin M on 191P2 at the receiver. From there the 15-volts dc is connected to the mixer/if module to enable the sense circuits. The 15-volts dc is also connected thru the module and 191P6 to connector 191P9 of amplifier AM-4859A/ARN-89 where it is used as bias voltage.

c. The loop antenna circuit is enabled when function select switch S2 is at COMP or LOOP.

(1) In COMP mode, 13-volt dc is connected thru contacts 12 and 4 of switch S2B rear, pin S on 191P7, pin 11 on 300P16, pin S on 191P2 at the receiver to the audio/servo module where it is used as bias voltage for the servo circuits. In loop mode, 14-volt dc from the wiper of R9 is connected thru contacts 2 and 4 of switch S2B rear, pin S on 191P7, pin 11 on 300P16, pin S on 191P2 of the receiver to the audio/servo module. The goniometer module is enabled by 15-volts dc from contacts 10 and 8 of switch S2A rear in the control.

d. The loop control has the same effect as rotating the antenna while operating in loop mode. Moving the control to L or to R causes a decrease or increase, respectively, in the bias voltage connected from contacts 2 and 4 of switch S2B rear. The voltage is routed thru pin S on 191P7 of the control, pin 11 on connector 300P16, pin S on 191P2 at the receiver to the servo circuits in the audio/servo module. This change in bias results in goniometer rotation.

e. The beat frequency oscillator bfo is enabled when CW/VOICE/TEST switch S1 is at CW. This position connects 15-volt dc thru contacts 9 and 7 of switch S2A front, pin F on 191P7, pin 6 on 300P16, pin F on 191P2 at the receiver to the bfo circuits in the mixer/if module.

f. When CW/VOICE/TEST switch S1 is at TEST, 15-volt dc is routed thru contacts 12 and 2 of switch S2B rear, it causes the loop circuits to operate in the same manner as when the LOOP switch is set at R as described in (d) above. This causes the goniometer and the indicator to rotate 180°. Repositioning switch S1 to VOICE or CW causes the goniometer and indicator to return to their original positions.

g. Ac power from the 26-volt ac instrument bus is connected thru 5-ampere ADF circuit breaker 191CB2, pin 29 on 300P4, pins 1D and 1E on TB11, to pin D on 191P1 at receiver R-1496/ARN-89. In the receiver, the 26-volt ac is connected to the goniometer circuits.

2-20. AN/ARN-89B Audio and Rf Gain Control Circuits

(fig. FO-13).

NOTE

Only the copilot's audio circuits are discussed. Operation at the other interphone stations is similar.

a. When the AN/ARN-89B is operating in COMP mode, the AUDIO control on control C-7392A/ARN-89 sets the amplitude of the audio fed to the interphone system. The audio from detector Q15 is connected thru pin P on 191P2 at receiver R-1496A/ARN-89, pin 10 on 300P16, and pin P on 191P7 at control C-7392A/ARN-89 to contact 9 of S2B front. The audio is routed thru contacts 9 and 5 of S2B front to one side of audio adjust resistor R6. The other side of R6 is connected thru contacts 3 and 11 of S2B front to ground. Audio from the wiper arm of R6 is connected thru contacts 6 and 10 of S2B rear and pin G on 191P7 at control C-7392A/ARN-89. The audio is then connected thru pin 7 on 300P16, and pin G on 191P2 of receiver R-1496A/ARN-89 to audio amplifier Q1 in audio/servo module 1A2. Transistors Q1 and Q2 amplify the audio and connect it thru output transformer T1, pins A and B on 191P1 to pin 20 on 187P7 at the interphone junction box. The interphone junction box provides a common tie point to permit signal distribution to the other five C-6533/ARC. The audio is connected thru pin 39 on 187P1 at the interphone junction box, and pin WW on 187P26 at the copilot's C-6533/ARC to AUX switch S8. With the AUX switch at ON, audio is fed thru VOL control R34 to headset amplifier AR2. The audio is amplified in AR2 and connected to the headset thru pins TT and XX on 187P26 at the copilot's C-6533/ARC.

b. The AUDIO control of the C-7392A/ARN-89 functions as an rf gain control when the AN/ARN-89B is operating in ANT or LOOP mode. With mode select switch S2 at ANT or LOOP, a ground is connected thru contacts 3 and 1 of switch S2B front to the emitter of transistor Q1. With Q1 enabled, moving the wiper arm of AUDIO control R6 causes a change in the dc voltage connected thru pin E on 191P7. This dc voltage is connected thru pin 5 on 300P16, pin E on 191P2 at receiver R-1496A/ARN-89 to the base of Q12 in mixer/if module 1A1. This voltage controls conduction of Q12 and Q13 which in turn controls the gain of if amplifier Q7. The audio from receiver R-1496A/ARN-89 is connected thru the interphone system in the same manner as described in *a.* above.

SECTION VIII VHF NAVIGATION AND INSTRUMENT LANDING SYSTEM FACILITY

2-21. VOR/ILS Receiving Set AN/ARN-123.

The vhf navigation and instrument landing system facility circuits covered by descriptions and service diagrams include power and audio circuits.

2-22. AN/ARN-123 Power Circuits

(fig. FO-14).

a. Twenty-eight-volt dc to operate the vor/ils facility is obtained from the 28-volt dc essential bus. The voltage is routed thru 5-ampere VOR circuit breaker 192CB1, pin 18 on 300P2, pin 16 on 300P58, and pin 6 on 192P1 at control C-10048/ARN-123. The 28-volt dc return is routed thru pin 10 on 192P1, pin 17 on 300P58 to ground. Switched 28-volt dc is routed thru pin 8 on 192P1 of the control and pin 1 on 300P13 to pin 21 on 192P10 at receiver R-2023/ARN-123. It supplies all the dc power for the receiver.

b. Twenty-six volt ac for operation of receiver R-2023/ARN-123 is obtained from No. 1 instrument bus. The voltage is routed thru 5-ampere VOR circuit breaker 192CB2, pin 31 on 300P4 and pin 3B and 3A on TB11 to pin 18 on 192P10 at the receiver.

2-23. AN/ARN-123 Audio Circuit (VOR/LOC)

(fig. FO-15).

NOTE

Only the copilot's audio circuits are discussed. Operation from the other interphone stations is similar.

a. Headset audio from receiver R-2023/ARN-123 is connected thru control C-10048/ARN-123 and the interphone junction box to the C-6533/ARC communication control. The interphone junction box provides common tie points to permit signal distribution to any C-6533/ARC.

b. Receiver audio from pin 15 on 192P10 of receiver R-2023/ARN-123 is routed thru pin 33 on 300P13 to pin 3 on 192P1 at control C-10048/ARN-123. From the control, audio is routed thru pin 2 on connector 192P1 and pin 38 on 300P13 to pin 14 on 187P7 at the interphone junction box. The audio is routed from the junction box thru pin 35 on 187P1 to pin UU on connector 187P26 at the copilot's C-6533/ARC. The audio is amplified in headset amplifier and routed to the headset thru pins XX and TT on 187P26.

2-24. AN/ARN-123 Audio Circuit (Marker Beacon)
(fig. FO-16).

NOTE

Only the copilot's audio circuits are discussed. Operation from other interphone stations is similar.

a. Headset audio from receiver R-2023/ARN-123 is connected thru control C-10048/ARN-123 and the interphone junction box to the C-6533/ARC communication control. The interphone junction box provides common tie points to permit signal distribution to any C-6533/ARC.

b. Receiver audio from pin 4 on 192P10 at receiver R-2023/ARN-123 is routed thru pin 35 on 300P13 to pin 19 on 192P1 of control C-10048/ARN-123. From the control, audio is routed thru pin 18 on 192P1, pin 61 on 300P13 to pin 17 on 187P7 at the interphone junction box. The audio is routed from the junction box thru pin 32 on 187P1 to pin HH on 187P26 at the copilot's C-6533/ARC. The audio is amplified in headset amplifier and routed to the headset thru pins XX and TT on connector 187P26.

SECTION IX DOPPER NAVIGATION FACILITY

2-25. Doppler Navigation Set AN/ASN-128.

The doppler navigation facility circuits covered by descriptions and service diagrams includes power circuits.

2-26. AN/ASN-128 Power Circuits
(fig. FO-17).

a. Twenty-eight-volt dc to operate the doppler navigation set is obtained from No. 2 28-volt dc primary bus. The voltage is routed thru 5-ampere DOPPLER circuit breaker 197CB2, pin 26 on 300P6 and pin 27 on 300P11 to a butt splice. From the butt splice, the voltage is routed to pin C on 197P5 of computer display unit CP-1252/ASN-128. From the butt splice, the voltage is also routed thru the contacts of relay 232K3 and pin 8H and 8J of TB7 to pin J on 197P5 at computer display unit CP-1252/ASN-128. Setting the master caution panel DIM/BRIGHT switch to DIM, energizes relay 232K3, routing the voltage thru the 750 ohm resistor 197R1 to dim the annunciator lights on the computer display unit.

b. Twenty-eight volt dc is also routed thru DOPPLER circuit breaker 197CB2, pin 30 on 300P7, to pin W on 197P2 of signal data comparator CU-3338/ASN-128, where it supplies the power requirements for that component.

c. Twenty-six volt ac from No. 1 instrument bus is routed thru 5-ampere DOPPLER circuit breaker 197CB1, pin 33 on 300P3, to pin T on 197P2 at signal data comparator CU-3338/ASN-128 where it supplies the power requirements for that component.

SECTION X DIRECTIONAL GYRO FACILITY

2-27. Gyromagnetic Compass Set AN/ASN-43.

The AN/ASN-43 circuits covered by description and service diagrams include ac power and reference voltage distribution, slaving control and indicator control.

2-28. AN/ASN-43 Power and Control Circuits
(fig. FO-18).

a. Ac power from the No. 1 115-volt ac bus is connected thru 5-ampere CMPS circuit breaker 063CB1 thru pin 48 on 300P4 to pin C on 063P1 of Directional Gyro CN-998/ASN-43. From pin C on 063P1, the 115-volt ac is routed to time totalizing meter M1 and transformer T1. The transformer provides 26-volt ac, which is routed thru pin M on 063P1, pin 52 on 300P50, and pin 52 on 300P54 to pin E and the rotor of compass transmitter T-611/ASN. From the rotor and pin D, the circuit is completed to ground thru pin 51 on 300P54 and pin 51 on 300P50.

b. Ac power from No. 1 26-volt ac bus is connected thru 5-ampere CMPS circuit breaker 063CB2 thru pin 27 on 300P1, pin 26 on 300P19, pin c of Compass Control C-8021/ASN-75 to transformer T1. The transformer provides 115-volt ac which is routed thru pin X on connector 063P2 of the control, pin 45 on 300P21, pin R on 063P1 to the heading synchro in the directional gyro.

c. With the compass switch at SLAVED, 40-volt dc from the gyro power supply is routed thru pin P on 063P1, pins 8D and 8A on TB17, pin 58 on 300P21, and pin T on 063P2 to the switch on the compass control. From the switch the 40-volt dc is routed thru pin S on 063P2, pin 52 on 300P21, and pin E on 063P1 to K1 relay in the directional gyro. With K1 energized, the compass transmitter is connected to the precession coils in the gyro. With K1 deenergized (FREE mode), the precession coils are connected to the internal circuits of the gyro amplifier.

2-29. AN/ASN-43 Indicating Circuits
(fig. FO-19).

The signal from the heading synchro in Directional Gyro CN-998/ASN-43 is routed thru pins H, J, and G on 063P1, pins 6-G, 6-H, 6-J, 6-A, 6-B, and 6-C on TB15, and pins 57, 56, and 51 on 300P21 to pins J, K, and H on 063P2 at Compass Control C-8021/ASN-75. From there the heading signal is connected thru the heading differential synchro thru pins M, N, and L on 063P2. The signal continues thru pins 59, 60, and 61 on 300P21, pins 6-A, 6-B, 6-G, and 6-H on TB11, pins 7-A and 7-B on TB11, pins 2, 3, and 4 on 300P12 and pins 13, 14, and 15 on 066P1 and 066P2 on the pilot's and copilot's horizontal situation indicators.

SECTION XI VGI FACILITY

2-30. Vgi Facility.

The vgi circuits covered by descriptions and circuit diagrams include ac and dc power distribution, normal/emergency transfer control and indicating circuits.

2-31. Vgi Power and Control Circuits
(fig. FO-20).

a. Ac power from the No. 2 115-volt ac bus is routed thru 5-ampere PILOT VGI circuit breaker 062CB3 to pin 5 on 300P7 and from No. 1 ac bus thru COPLT VGI circuit breaker 062CB2 to pin 27 on 300P4.

(1) The ac voltage from pin 5 on connector 300P7 is connected to pin 1A on TB15. From pins 1-B, 1-D and 1-E on TB15, ac voltage is routed to pins L, B, and S on 062P4 of the pilot's displacement gyro, where it is connected to the rotors of the pitch and roll synchros and to the gyro motor. Additionally 115-volt ac from pin 1C on TB15 is connected thru pin 28 on 300P12, 4-K, 4-L, and 4-M on TB8 to the NORM contacts of switch 062S2, and EMERG contacts of 062S1 to pin B on 062P2 at the pilot's attitude indicator.

(2) Ac voltage from pin 27 on 300P4 is connected to pin 2A on TB15. From pins 2-B, 2-D, and 2-E on TB15, ac voltage is routed thru pins L, B, and S on 062P3 of the copilot's displacement gyro, where it is connected to the rotors of the pitch and roll synchros and the gyro motor. Additionally, 115-volt ac from pin 2C on TB15 is routed thru pin 27 on 300P12 and pins 5-A, 5-B, and 5-C on TB8 to the NORM contacts of switch 062S1 and the EMERG contacts of switch 062S2 to pin B on 062P1 at the copilot's attitude indicator.

b. Power to operate the gyro transfer relay is obtained from the No. 2 28-volt dc bus. The 28-volt dc is connected thru 5-ampere CONT VGI circuit breaker 062CB1, pin 13 on 300P6, and pin 12 on 300P11 to pin 5J on TB8. From pins 5-G and 5-H on TB8, the voltage is connected to the EMERG contacts of switches 062S1 and 062S2. With either switch at EMERG, the 28-volt dc is routed to the selected relays thru pins 26 and 29 on connector 300P11, to pins 23 on connectors 062P5 and 062P6. Twenty-eight volts dc is also routed thru pin 23 on connector 300P7, to pin 5A on TB11, from 5C on TB11 to pin X1 on the pilot's relay and from pin 5B on TB11 to pin X1 on the copilot's relay. With the CONT VGI circuit breaker closed, the relays are energized, providing a ground for the No. 1 and No. 2 afcs computers and a ground for the OFF flag circuit in the attitude indicators.

2-32. Vgi Indicating Circuits
(fig. FO-21).

NOTE

Only the copilot's indicating system is discussed. Operation of the pilot's system is similar.

a. Pitch and roll signals are generated in the copilot's displacement gyro. The power warning OFF flag signal is generated in the copilot's attitude indicator.

(1) Signals from the roll synchro are routed thru pins T, U, and V on 062P3 at copilot's displacement gyro 9000F, pins 4-C, 4-J, and 5-E, on TB15, and pins 4-A, 4-H, and 5-B on TB15 to pins 4, 5, and 6 on 062P5 at the gyro transfer relay. With the copilot's VGI NORM EMER switch (not shown) at NORM, roll signals are connected thru normally closed contacts of the copilot's relay, pins 11, 12, and 13 on 062P5, pins 34, 35, and 36 on 300P11, and pins D, E, and F on 062P1 at the copilot's attitude indicator where they are connected to the roll synchro.

(2) Pitch signals from the pitch synchro are routed thru pins M, N, and P on 062P3 at copilot's displacement gyro 9000F, pins 3-C, 1-J, and 2-J on TB15, and pins 3-B, 1-H, and 2-H to pins 1, 2, and 3 on 062P5 at the gyro transfer relay. With the copilot's VGI NORM EMER switch (not shown) at NORM, the pitch signals are connected thru normally closed contacts of the copilot's relay, pins 8, 9, and 10 on 062P5, and pins 30, 31, and 32 on 300P11 to pins H, P, and R on 062P1 at the copilot's attitude indicator, where they are connected to the pitch synchro.

(3) Power for the power OFF warning flag is provided by the secondary winding of transformer T101 (not shown) in the attitude indicator. The signal is routed thru pin J on 062P1, at the copilot's attitude indicator and pin 33 on 300P11 to pin 14 on 062P5 at the gyro transfer relay. With the copilot's VGI switch at NORM, the flag signal is connected thru normally closed contacts of the copilot's relay and pin 7 on 062P5, to the contacts of relay 062K1. With the CONT VGI circuit breaker closed, relay 062K1 is energized, providing a ground for the flag signal.

b. When the copilot's VGI switch is set to EMER, the copilot relay in the gyro transfer relay energizes, causing the pitch roll and power warning flag signals from the pilot's displacement gyro to be displayed on the copilot's, as well as the pilots attitude indicator.

SECTION XII RADAR ALTIMETER FACILITY

2-33. Altimeter Set Electronic AN/APN-209.

The radar altimeter circuits covered by descriptions and service diagrams includes power and control circuits.

2-34. AN/APN-209 Power and Control Circuits (fig. FO-22).

a. Clockwise rotation of the LO SET knob (not shown) on the pilot's or copilot's indicators completes the system power circuit. Setting the RAD ALT DIM BRT control on the pilots' instrument panel controls the brightness of the HI, LO caution lights and the digital display on the indicators. The integral lighting is provided by the instrument panel lighting.

b. Twenty-eight volt dc to operate the radar altimeter system is obtained from the No. 2 28-volt dc bus. The voltage is routed thru 5-ampere RAD ALT circuit breaker 195CB1, pin 15 on 300P6 and pin 15 on 300P11 to pin 1A on TB6. From pin 1B on TB6, the voltage is routed to pin 9 on 195P1 at receiver/transmitter/indicator RT-1115A/APN-209 thru a filter, and short circuit, and overvoltage protection circuits to the power transformer which provides the voltages necessary for system operation. From pin 1C on TB6, 28-volt dc is also routed thru pin 1 on 195P5 at indicator ID-1917/APN-209 and a filter and an overvoltage protection circuit to the power transformer, which provides the voltages necessary for system operation. Twenty-eight volt dc from pins 1D and 1E on TB6 is routed to the pilot's and copilot's RAD ALT DIM BRT control to control brightness of the HI and LO caution lights and digital display.

c. Reliability, auxiliary analog altitude, push-to-test, and self test confidence signals generated in receiver/transmitter/indicator RT-1115A/APN-209 are routed thru TB6 to indicator ID-1917/APN-209 and No. 1 afcs computer.

SECTION XIII IFF FACILITY

2-35. Transponder Set AN/APX-100.

IFF circuits covered by descriptions and service diagrams includes power and audio circuits.

2-36. AN/APX-100 Power and Control Circuits (fig. FO-23).

a. Twenty-eight volt dc to operate the iff system is obtained from No. 2 28-volt dc bus. The voltage is routed thru 5-ampere IFF circuit breaker 185CB1, pin 14 on 300P6 and pin 13 on 300P11 to a butt splice. From the splice the voltage is routed to pins 25 and 26 on connector 185P1 at receiver-transmitter RT-1285/APX-100. From the splice the voltage is also routed to the IFF caution light. One side of the light is connected to ground. Closing the press-to-test switch connects 28-volt dc from pin 3 and lights the light.

b. From pin 40 on 185P1 at receiver-transmitter RT-1285/APX-100, 28-volt dc is routed thru pin 17 on 300P10 to pin 31 on 185P8 at computer KIT-1A/TSEC, where it supplies the power requirements for that component. From pin 19 on 185P1 at receiver-transmitter RT-1285/APX-100, 26-volt ac is routed thru pin 5 on 300P71 to pin 21 on 201P12 at comparator CM-400/APR-39. This suppression voltage is routed to comparator CM-440/APR-39 during IFF transmission.

c. Altitude data is coded in altimeter AAU-32/A and routed thru 196P2 to 185P1 of receiver-transmitter RT-1285/APX-100. When interrogated in mode C, the data is transmitted thru the antenna to the ground station.

2-37. AN/APX-100 Audio Circuits (fig. FO-24).

NOTE

Only the copilot's audio circuits are discussed. Operation from the other interphone stations is similar.

a. Headset audio from transponder set RT-1285/APX-100 is connected thru the interphone junction box directly to the C-6533/ARC communication control. The junction box provides common tie points to permit signal distribution to any C-6533/ARC.

b. Receiver audio from pin 21 on 185P1 of receiver-transmitter RT-1285/APX-100 is routed thru pin 18 on 300P10 to pin 1 on connector 187P7 at the interphone junction box. The audio is routed from the junction box thru pin 8 on 187P1 to pin FF on 187P26 at the copilot's C-6533/ARC. The audio is amplified in the headset amplifier and routed thru pins XX and TT on 187P26 to the headset.

SECTION XIV DETECTING SET RADAR SIGNAL FACILITY

2-38. Detecting Set, Radar Signal AN/APR-39.

The detecting set circuits covered by descriptions and service diagrams includes power and control and audio circuits.

2-39. AN/APR-39 Power and Control Circuits

(fig. FO-25).

a. Twenty-eight volt dc to operate the detecting set is obtained from No. 1 28-volt dc bus. The voltage is routed thru 5-ampere RAD WARN circuit breaker 201CB1, pin 19 on 300P2, and pin 21 on 300P58, to pin 12 on 201P2 at control C-9326/APR-39. With the PWR switch on the control set to ON, 28-volt dc from pin 9 on 201P2 at the control is routed to pin 9 on 201P1 of indicator IP-1150/APR-39 and from pin 2 on 201P2 of the control thru pin 49 on 300P13 to pin 12 on 201P12 of comparator CM-440/APR-39.

b. Indicator IP-1150/APR-39 displays signals received by the antennas. Signals from forward right and left antenna (not shown) are routed to forward receiver R-1838/APR-39 and then thru 201P18 and 201P19 to pins 8 and 9 on 201P12 at comparator CM-440/APR+39. Signals from aft right and left antenna (not shown) are routed to aft receiver R-1838/APR-39 and then thru 201P3 and 201P4, 201P21 and 201P22 to pins 18 and 19 on 201P12 at the comparator. The signals are processed in the comparator and routed thru pins 1, 2, 3, and 4 on 201P12 pins 4, 12, 29, and 28 on 300P13 to pins 1, 2, 3, and 4 on 201P1 at indicator IP-1150/APR-39 where they are displayed.

2-40. AN/APR-39 Audio Circuit

(fig. FO-26).

NOTE

> Only the copilot's audio circuits are discussed. Operation from other interphone stations is similar.

a. Headset audio from control C-9326/APR-39 is connected thru the interphone junction box to the C-6533/ARC communication control. The junction box provides common tie points to permit signal distribution to any C-6533/ARC.

b. Audio from pin 14 on 201P2 at control C-9326/APR-39 is routed thru pin 13 on 300P71 to pin 24 on 187P7 at the junction box. The audio from the junction box is routed thru pin 29 on 187P1 to pin LL on 187P26 at the copilot's C-6533/ARC. The audio is amplified in headset amplifier and routed to the headset thru pins XX and TT on 187P26.

SECTION XV COUNTERMEASURES FACILITY

2-41. Countermeasures Facility AN/ALQ-156.

The countermeasures set circuits covered by description and circuit diagram include ac and dc power distribution.

2-42. AN/ALQ-156 Power and Control Circuits (fig. FO-27).

NOTE

> Numbers in parenthesis are effective on 85-24322 and subq.

a. Ac power from the No. 2 115-volt ac bus is routed thru 5-ampere MSL DET SYS circuit breaker 202CB1 and thru pins 37, 38, and 39 on 300P7 to pins A, B, and C on 202P1 at Receiver-Transmitter RT-1220/ALQ-156. From there the voltage is connected to normally open contacts of relay K1.

b. Dc power from the No. 2 28-volt dc primary bus is routed thru 5-ampere MSL DET SYS circuit breaker 202CB2 and pin 36 on plug 300P7 to pin J on plug 202P1 at Receiver-Transmitter RT-1220/ALQ-156. From there the voltage is routed thru the receiver-transmitter, pin e (28) on 202P2 to pin e on 202P3 at Control Indicator C-10131/ALQ-156. From pin e on 202P3, the voltage is routed to the power switch. With the power switch set at ON, 28-volt dc is routed thru pin f on 202P3 of the control indicator and pin f (29) on 202P2 at the receiver-transmitter to relay K1. From relay K1, the return path is routed thru an overvoltage overcurrent control circuit and pin K on 202P1 of the receiver-transmitter to ground.

c. With the POWER switch at ON and relay K1 energized, the closed contacts route ac power to the power supply rectifier/regulator circuit which provides low dc voltage for the system. Three phase ac is also routed to the blower motor and phase A is connected to the elapsed time meter. Twenty-eight volt dc is also routed to the STATUS light on the control indicator. If an overvoltage or overcurrent condition occurs, the return path to relay K1 opens, deenergizing the relay and removing ac and dc power from the system.

CHAPTER 3

AVIATION UNIT INTERMEDIATE MAINTENANCE

SECTION I GENERAL MAINTENANCE TECHNIQUES

WARNING

Dangerous voltages are present in these electronic equipment configurations. Be careful when you work on the 150- and 300-volt dc B+ circuits and on the 115- and 200-volt ac generator output circuits. Disconnect the primary ac or dc power before troubleshooting unless you are doing operating checks or voltage measurements.

3-1. General

The electronic equipment configuration maintenance data for AVIM in this chapter supplements the AVUM maintenance procedures in TM 11-520-240-20. This data also supplements the separate technical manuals on the electronic equipments to provide complete repair and maintenance instructions of all CH-47D electronic equipments. The systematic maintenance procedures begin with the functional operation and sectionalizing checks done by AVUM and AVIM maintenance personnel on the aircraft. The checks are carried on to removal and installation of units or components. The maintenance procedures then continue with bench maintenance of the component. Para 3-6 thru 3-19 are troubleshooting charts. Para 3-20 thru 3-30 provide terminal board voltages. The data will assist you in tracing trouble to a particular basic signal equipment or an electronic equipment unit. If a fault is localized to a basic signal item, replace it. If the fault is within an electronic equipment unit, refer to Section IV for the required procedures.

3-2. Organization of Troubleshooting Procedures

a. General. Troubleshoot the electronic equipment configuration in the CH-47D in three steps. The first step is sectionalizing. This traces the fault to a facility. The second step is localizing. This traces the fault to a unit of the facility and/or associated junction box or wiring. On the bench, localizing includes tracing the fault to a stage or module within the unit. The third step is isolation. This isolates the fault to a part of the unit.

b. Sectionalization. Listed below are tests arranged to reduce unnecessary work and to aid you in tracing faults to a facility.

(1) Visual inspection. This locates obvious faults prior to operation or testing circuits. Connector mating, circuit breakers, terminal boards, connections, wiring, etc., should be checked to sectionalize the fault to a particular facility.

(2) Operational tests. Operational tests often locate the fault. In many cases, the tests will help determine the exact nature of the fault. The periodic preventive maintenance checks and services chart (TM 11-1520-240-20) may be used as an operational test. Additional operational tests are in Chapter 4.

c. Localization. Listed below are steps to aid you in localizing faults within the facility to a component or to the facility wiring.

(1) Electronic configuration performance testing. Testing the facility performance for normal operation often reveals the faulty component.

(2) Voltage and resistance measurements. Compare the normal voltages and resistances in the troubleshooting charts and the terminal board charts with actual readings.

(3) Troubleshooting charts. The troubleshooting charts (para 3-6 thru 3-19) will aid you in localizing the fault to a component, subassembly, module, or stage.

(4) Intermittent troubles. In all tests, you should not overlook the possibility of intermittent faults. If present, you often can make this type of fault appear by tapping or jarring the equipment and checking component wiring and connections.

(5) Signal substitution. Signal substitution enables you to localize a component fault quickly to a stage or module. Procedures to check facilities with test equipment are in Chapter 4.

d. Isolation. After you localize the fault (*c.* above), steps (1) thru (4) below will aid to isolate it to a circuit element.

(1) Voltage measurements. Some equipment is transistorized. When you measure voltages, use tape or plastic sleeving (spaghetti) to insulate the entire test prod, except for the extreme tip. A momentary short can ruin a transistor. Use the same or equivalent multimeter specified in para 3-3.

(2) Resistance measurements. Make resistance measurements only as directed on voltage and resistance

charts. Be sure you set the multimeter to the resistance range specified, otherwise its reading will not be correct.

CAUTION

> Before you use any multimeter to measure transistor resistances, check the open-circuit voltage across the multimeter test leads. Do not use the multimeter if the open-circuit voltage exceeds 1.5. Also, since the RX1 range normally connects the multimeter battery directly across the test leads, the comparatively high current (50 ma or more) may damage the transistor under test. As a general rule, you should not use the RX1 range when testing low-power transistors.

(3) Intermittent troubles. In all the tests, you should not overlook the possibility of intermittent faults. If present, you often can make this type of fault appear by tapping or jarring the equipment. Visually check wiring and connections. Minute cracks in printed circuit boards can cause intermittent operation. A magnifying glass is often helpful in locating faulty printed boards. Continuity measurements of printed wiring may be made with the same technique used on conventional wiring. Observe the multimeter resistance measurement precautions discussed in (2) above.

(4) Resistor and capacitor color code diagram. The resistor and capacitor color code diagram (fig. FO-1) will aid you in determining value, voltage rating, and tolerance of capacitors and resistors.

3-3. Test Equipment, Tools, and Materials Required

a. Test Equipment Required. In addition to the items listed for AVIM testing (Chapter 4), the following items are required for AVIM maintenance.

TEST EQUIPMENT	TECHNICAL MANUAL	USE
Multimeter TS-352B/U	TM 11-6625-366-15	Terminal board and connector voltage and resistance measurements.
Headset TS-33A		Checking terminal board audio.
Headset H-216A		Checking audio at receiver jack.
Microphone M-52B/U	TB SIG 330	Checking audio at transmitter jack.
Microphone NAF 213264-6		Checking audio at transmitter jack.
Audio Oscillator TS-421A/U	TM 11-6625-355-12	Checking audio circuits.
Capacitance, Impedance, Resistance, Bridge ZM-11A/U		Checking capacitors.
Ground Transponder Tester — Honeywell Inc. Type UG2330AA01	Operation and Service Instructions	Flight line test of transponder

b. Tools and Material Required. The following tools and material are required for AVIM maintenance.

ITEM	FSN OR MS
Enamel, electrical insulating, Glyptal 1201	MIL-E-22118
Cleaning compound	7930-395-9542
Tool Kit, Electronic Equipment TK-105/G	5180-610-8177

SECTION II CONFIGURATION INTERUNIT TROUBLESHOOTING

3-4. Introduction

a. When a fault in the electronic equipment occurs, your first step in correcting it is to sectionalize the cause to a particular unit. Do the operational checks in the preventive maintenance checks and services chart (TM 11-1520-240-20). If the operational checks and supporting troubleshooting charts are inconclusive as to which unit or item is causing the trouble, do the AVIM in-aircraft troubleshooting procedures in this section for the particular facility.

b. The AVIM in-aircraft troubleshooting procedures involve the use of special portable test sets not allocated to the organizational maintenance level. Since some controls for the electronic equipment and the other basic components are remotely located, some troubleshooting procedures require more than one person. The AVUM maintenance repairman should remain in the cockpit and operate the controls on command from the AVIM maintenance repairman. He will then connect the test sets to the equipment components either on the radio shelves or in the electronic equipment compartment. The tests will be done by the AVIM maintenance repairman.

3-5. Troubleshooting Charts

Troubleshooting charts for each electronic facility are in para 3-6 thru 3-19. The charts list the symptoms, probable cause, and procedure for isolating trouble to a unit of signal equipment, an electronic equipment unit, or to helicopter wiring. After you locate trouble, repair or replace the faulty equipment or repair the helicopter wiring.

3-6. Interphone Facility Troubleshooting Chart

SEQUENCE NO	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No audio reception, sidetone, or transmission at copilot or left gunner's station	*a.* Open circuit breaker *b.* No dc power	*a.* Close INTPH LH circuit breaker *b.* Check for 28-volt dc at pin S on connector 187P26 and 187P10. If voltage is present, replace COMM CONT C-6533/ARC (fig. FO-2)
2	No audio reception or sidetone heard at one station	*a.* Faulty headset receiver *b.* Faulty C-6533/ARC	*a.* Check headset by substitution. Replace if faulty *b.* Check C-6533/ARC by substitution. Replace if faulty
3	Transmitters cannot be modulated from a pilot's station	*a.* Faulty headset microphone *b.* Faulty amplifier circuit in C-6533/ARC *c.* Faulty wiring	*a.* Replace headset *b.* Check C-6533/ARC by substitution. Replace if faulty *c.* Check for open, shorted, or grounded wiring between C-6533/ARC and interphone junction box (fig. FO-2 and FO-3)
4	Either pilot's p-t circuit inoperative at 1ST POS INTERPHONE	*a.* Faulty TRIGGER switch *b.* Faulty wiring	*a.* Press the TRIGGER switch to 1ST POS INTERPHONE and check for continuity between pins P and S of the grip plug. If there is no continuity, replace the TRIGGER switch *b.* Check for open or reversed wiring between grip plug and interphone junction box (fig. FO-2)
5	Pilot's foot switch inoperative	*a.* Faulty foot switch *b.* Faulty wiring	*a.* Press foot switch and check continuity between pins 2 and 6 on connector 187P2 of interphone junction box. If there is no continuity, replace foot switch (fig. FO-2) *b.* Check for open wires between interphone junction box and foot switch
6	Copilot's foot switch inoperative	*a.* Faulty foot switch *b.* Faulty wiring	*a.* Press foot switch and check continuity between pins 2 and 6 on connector 187P1 of interphone junction box. If there is no continuity, replace foot switch (fig. FO-2) *b.* Check for open wires between interphone junction box and foot switch (fig. FO-2)
7	One exterior interphone station cannot be heard at other interphone stations	*a.* Faulty headset *b.* Faulty p-t switch	*a.* Replace headset *b.* Press p-t switch and check continuity in the p-t circuit (fig. FO-2)
8	Left gunner cannot be heard at other stations	*a.* Faulty headset *b.* Faulty left gunner p-t switch *c.* Faulty left gunner's C-6533/ARC *d.* Faulty wiring	*a.* Replace headset *b.* Press gunner's p-t switch or foot switch and check continuity between pins E and K on connector 187P10 of C-6533/ARC. If there is no continuity, replace p-t switch (fig. FO-2) *c.* If the left gunner's p-t switch is OK, replace the C-6533/ARC *d.* Check for open wires between C-6533/ARC and foot switches (fig. FO-2)

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
9	Right gunner cannot be heard at other stations	Same as item 8	Same as item 8, except reference right gunner interphone circuits
10	No audio reception or sidetone heard at troop commanders station	*a.* Faulty headset-receiver	*a.* Check headset by substitution. Replace if faulty.
		b. Faulty C-6533/ARC	*b.* Replace C-6533/ARC by substitution. Replace if faulty.
11	No audio reception or sidetone heard at aft or external stations	*a.* Faulty headset-receiver	*a.* Check headset by substitution. Replace if faulty.
		b. Faulty C-6533/ARC	*b.* Replace C-6533/ARC by substitution. Replace if faulty.
		c. Faulty wiring	*c.* Check for open, shorted, or grounded wiring between C-6533/ARC and the aft or external stations.

3-7. No. 1 Radio Set AN/ARC-186 Troubleshooting Chart

NOTE

If Encoder TSEC/KY-28 is installed, disconnect it, and connect the adapter plugs for normal radio operation before troubleshooting. If fm functions properly without the TSEC/KY-28, encoder TSEC/KY-28 or control C-8157/ARC is faulty and must be replaced.

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No tone, received audio, or sidetone at any interphone station	*a.* Open circuit breaker	*a.* Close VHF No. 1 AM FM circuit breaker
		b. Faulty receiver-transmitter RT-1354/ARC-186	*b.* Check for 28-volt dc at pin D on plug 182P4 at RT-1354/ARC-186. If voltage is present, replace RT-1354/ARC-186 (fig. FO-4)
		c. Faulty audio threshold device MD-1047/A	*c.* Check continuity between pins F and J on plug 188P2 of MD-1047/A. If there is no continuity, replace MD-1047/A (fig. FO-4)
		d. Open audio line between receiver-transmitter and audio threshold device	*d.* Check continuity on receiver audio line. Repair or replace wiring (fig. FO-4)
2	No tone or audio at one interphone station	*a.* Faulty COMM CONT C-6533/ARC	*a.* Replace C-6533/ARC
		b. Faulty headset, audio amplifier in C-6533/ARC, or open wiring between headset and C-6537/ARC	*b.* Refer to interphone facility troubleshooting (para 3-6)
3	Receiver-transmitter RT-1354/ARC-186 background noise is not squelched	Faulty or maladjusted squelch circuits in receiver-transmitter RT-1354/ARC-186	Adjust squelch control or replace receiver-transmitter RT-1354/ARC-186
4	Receiver audio not adjustable with the VOL control	Faulty VOL control in receiver-transmitter RT-1354/ARC-186	Replace receiver-transmitter RT-1354/ARC-186
5	Receiver audio not heard in headset at one COMM CONT C-6533/ARC when rotary selector switch is at 1	Faulty selector switch on COMM CONT C-6533/ARC	Replace COMM CONT C-6533/ARC
6	Sidetone or received audio not clear, distinct, or of adequate volume at any interphone station	Faulty receiver section in receiver-transmitter RT-1354/ARC-186	Replace receiver-transmitter RT-1354/ARC-186

SEQUENCE NO	SYMPTOM	PROBABLE TROUBLE	CORRECTION
7	Sidetone or received audio not clear, distinct, or of adequate volume at one interphone station	Faulty transmitter or receiver amplifier in COMM CONT C-6533/ARC	Refer to interphone facility troubleshooting (para 3-6)
8	Received audio at local station not clear or distinct at any interphone station	*a.* Faulty receiver-transmitter RT-1354/ARC-186 *b.* Faulty audio threshold device MD-1047/A	*a.* Replace receiver-transmitter RT-1354/ARC-186 *b.* Replace audio threshold device MD-1047/A
9	Received audio at local station not clear or distinct at one interphone station	Faulty COMM CONT C-6533/ARC	Replace COMM CONT C-6533/ARC
10	Cannot establish communications with local station. No sidetone heard in headset at any interphone station. Received audio normal	*a.* Faulty receiver-transmitter RT-1354/ARC-186 *b.* Open transmit audio line *c.* Open transmit control line	*a.* Replace receiver-transmitter RT-1354/ARC-186 *b.* Check continuity of wiring from pin K on plug 182P4 of receiver-transmitter RT-1354/ARC-186 to pin 1 on connector 187P35 of interphone junction box. Repair or replace wiring as required (fig. FO-5) *c.* Check continuity of wire from pin h on plug 182P4 of receiver-transmitter RT-1354/ARC-186 to pin F on connector 188P2 of audio threshold device MD-1047/A. Repair or replace wiring as required (fig. FO-4)
11	Function switch set at DF, but hsi NAV flag is in view	*a.* Faulty receiver-transmitter RT-1354/ARC-186 *b.* Open homing enable control line	*a.* Replace receiver-transmitter RT-1354/ARC-186 *b.* Check continuity of wire from pin R on connector 182P4 or receiver-transmitter to pin R on connector 182P16 of signal data comparator CM-492/ARC-186. Repair or replace wiring (fig. FO-4)
12	Homing signals not displayed on horizontal situation indicator (hsi)	*a.* Faulty receiver-transmitter RT-1354/ARC-186 *b.* Faulty signal data comparator CM-492/ARC-186 *c.* Faulty hsi or mode select panel	*a.* Replace receiver-transmitter RT-1354/ARC-186 *b.* Replace signal data comparator CM-492/ARC-196 *c.* Check by energizing the pilot's and copilot's hsi system. If one operates, replace the other one

3-8. No. 2 Radio Set AN/ARC-186 Troubleshooting Chart

SEQUENCE NO	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No tone, received audio, or sidetone at any interphone station	*a.* Open circuit breaker	*a.* Close VHF No. 2 AM FM circuit breaker
		b. Faulty receiver-transmitter RT-1354/ARC-186	*b.* Check for 28-volt dc at pin D on plug 182P1 of RT-1354/ARC-186. If voltage is present, replace RT-1354/ARC-186 (fig. FO-6)
		c. Faulty audio threshold device MD-1047/A	*c.* Check for continuity between pins E and S on plug 188P2 of MD-1047/A. If there is no continuity, replace MD-1047/A (fig. FO-6)
		d. Open audio line between receiver-transmitter RT-1354/ARC-186 and audio threshold device MD-1047/A	*d.* Check continuity on receiver audio line. Repair or replace wiring as required (fig. FO-6)
2	No tone or audio at one interphone station	*a.* Faulty COMM CONT C-6533/ARC	*a.* Replace C-6533/ARC
		b. Faulty headset, audio amplifier in COMM CONT C-6533/ARC, or open wire between headset and C-6533/ARC	*b.* Refer to interphone facility troubleshooting (para 3-6)
3	Receiver-transmitter RT-1354/ARC-186 background noise not squelched	Faulty or maladjusted squelch circuit in receiver-transmitter RT-1354/ARC-186	Adjust squelch control or replace receiver-transmitter RT-1354/ARC-186. (Refer to TM 11-1520-240-20)
4	Receiver audio not adjustable with VOL control	Faulty VOL control in receiver-transmitter RT-1354/ARC-186	Replace receiver-transmitter RT-1354/ARC-186
5	Sidetone or received audio not clear, distinct, or of adequate volume at any interphone station	Faulty receiver section in receiver-transmitter RT-1354/ARC-186	Replace receiver-transmitter RT-1354/ARC-186
6	Cannot establish communications with any local station. Sidetone not heard in headset at any interphone station. Received audio normal	*a.* Faulty receiver-transmitter RT-1354/ARC-186	*a.* Replace receiver-transmitter RT-1354/ARC-186
		b. Open transmit audio line	*b.* Check continuity of wiring from pin K on plug 182P1 of receiver-transmitter RT-1354/ARC-186 to pin 5 on connector 187P8 of the interphone junction box. Repair or replace wiring as required (fig. FO-7)
		c. Open transmit control line	*c.* Check continuity of wire from pin h on plug 182P1 of receiver-transmitter RT-1354/ARC-186 to pin E on connector 188P2 of audio threshold device MD-1047/A. Repair or replace wire as required (fig. FO-6)

3-9. Radio Set AN/ARC-164 Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No tone, received audio, or sidetone at any interphone station	*a.* Open circuit breaker *b.* Faulty receiver-transmitter RT-1167/ARC-164 *c.* Faulty audio threshold device MD-1047/A *d.* Faulty interphone wiring	*a.* Close UHF AM circuit breaker *b.* Check for 28-volt dc at pin D on plug 181P1 of receiver-transmitter Rt-1167/ARC-164. If voltage is present, replace RT-1167/ARC-164 (fig. FO-8) *c.* Check MD-1047/A by substitution. Replace if faulty *d.* Check interphone system wiring (fig. FO-2)
2	No tone or received audio at one interphone station	*a.* Faulty COMM CONT C-6533/ARC *b.* Defective headset, or open wiring between headset and C-6533/ARC	*a.* Check C-6533/ARC by substitution. Replace if faulty *b.* Refer to interphone facility troubleshooting (para 3-6)
3	Receiver background noise is not squelched	Defective or maladjusted squelch circuits in receiver-transmitter RT-1167/ARC-164	Replace receiver-transmitter RT-1167/ARC-164
4	Receiver audio not adjustable with VOL control	Faulty VOL control in receiver-transmitter RT-1167/ARC-164	Replace receiver-transmitter RT-1167/ARC-164
5	Sidetone or received audio not clear, distinct, or of adequate volume at any interphone station	Faulty receiver-transmitter RT-1167/ARC-164	Replace receiver-transmitter RT-1167/ARC-164
6	Cannot establish communications with any local station. Sidetone not heard in headset at any interphone station. Received audio normal	*a.* Faulty receiver-transmitter RT-1167/ARC-164 *b.* Open transmit audio line *c.* Open transmit control line	*a.* Replace receiver-transmitter RT-1167/ARC-164 *b.* Check continuity of wire from pin L on plug 184P1 of receiver-transmitter RT-1167/ARC-164 to pin A on plug 188P1 of audio threshold device MD-1047/A. Repair or replace wiring as required (fig. FO-9) *c.* Check continuity of wire from pin h on plug 181P1 of receiver-transmitter RT-1167/ARC-164 to pin G on plug 188P2 of audio threshold device MD-1047/A. Repair or replace wiring as required (fig. FO-8)

3-10. Radio Set AN/ARC-102 Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No tone, received audio, or sidetone at any interphone station	*a.* Open circuit breaker *b.* Faulty receiver-transmitter RT-698/ARC-102	*a.* Close HF circuit breakers *b.* Check for 28-volt dc at pins 16 and 4 on plug 184P3 of receiver-transmitter RT-698/ARC-102. If voltage is present, replace RT-698/ARC-102 (fig. FO-10)
2	No receiver audio heard in headsets	*a.* Faulty receiver-transmitter RT-698/ARC-102 *b.* Faulty wiring	*a.* Connect headset to the rt unit PHONE jack. If audio is not heard, replace RT-698/ARC-102 *b.* Check wiring between receiver-transmitter, HF control C-3940/ARC-94, and coupler CU-1658/ARC. Repair or replace wiring as required (fig. FO-10)
3	No tone or received audio at one interphone station	*a.* Faulty COMM CONT C-6533/ARC *b.* Defective headset or open wiring between headset and C-6533/ARC	*a.* Check C-6533/ARC by substitution. Replace if faulty *b.* Refer to interphone facility troubleshooting (para 3-6)
4	Receiver audio not adjustable with RF SENS control	Faulty RF SENS control in control C-3940/ARC-94	Check C-3940/ARC-94 by substitution. Replace if faulty
5	Transmitter can be keyed but not modulated from a pilot's station	*a.* Faulty microphone circuit *b.* Faulty wiring	*a.* Connect microphone to receiver-transmitter RT-698/ARC-102 MIC jack. If communications cannot be established with another hf station, replace RT-698/ARC-102 *b.* Check wiring between interphone junction box and receiver-transmitter RT-698/ARC-102 (fig. FO-11)
6	Sidetone heard but signal not transmitted	Faulty coupler, not tuning to selected frequency	Check coupler CU-1658/ARC by substitution. Replace if faulty
7	Receiver-transmitter does not cycle when a different frequency is selected	*a.* Faulty control C-3940/ARC-94 frequency selector circuits *b.* Faulty receiver-transmitter RT-698/ARC-102 frequency selector circuits	*a.* Check control C-3940/ARC-94 by substitution. Replace if faulty *b.* Check receiver-transmitter RT-698/ARC-102 by substitution. Replace if faulty
8	Sidetone or received audio not clear, distinct, or of adequate volume at any interphone station	Faulty receiver-transmitter RT-698/ARC-102	Check receiver-transmitter RT-698/ARC-102 by substitution. Replace if faulty
9	Cannot establish communications with local station. No sidetone in headset at any interphone station. Received audio normal	*a.* Faulty receiver-transmitter RT-698/ARC-102 *b.* Open transmit audio line *c.* Open transmit control line	*a.* Check receiver-transmitter RT-698/ARC-102. Replace if faulty *b.* Check continuity of wire from pin 37 on plug 184P3 of receiver-transmitter RT-698/ARC-102 to pin J on plug 188P1 of audio threshold device MD-1047/A. Repair or replace wire as required (fig. FO-11) *c.* Check continuity of wire from pin m on plug 184P5 of control C-3940/ARC-94 to pin h on plug 188P2 of audio threshold device MD-1047/A. Repair or replace wire as required (fig. FO-10)

3-11. Direction Finder Facility (ADF) AN/ARN-89B Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No power to receiver R-1496A/ARN-89	*a.* Open circuit breaker *b.* Faulty receiver R-1496A/ARN-89	*a.* Close ADF circuit breakers *b.* Check for 28-volt dc at pin L on plug 191P1 of receiver R-1496A/ARN-89. If voltage is present, replace R-1496A/ARN-89 (fig. FO-12)
2	No TUNE meter indication or audio output in any mode	*a.* Faulty impedance matching amplifier AM-4859A/ARN-89 *b.* Faulty receiver R-1496A/ARN-89 *c.* Faulty antenna cable	*a.* Check amplifier AM-4859A/ARN-89 by substitution. Replace if faulty *b.* Check receiver R-1496A/ARN-89 by substitution. Replace if faulty *c.* Replace antenna cable
3	No TUNE meter indication or audio output in LOOP mode	*a.* Faulty receiver R-1496A/ARN-89 *b.* Faulty loop antenna AS-2108A/ARN-89	*a.* Check receiver R-1496A/ARN-89 by substitution. Replace if faulty *b.* Replace loop antenna AS-2108A/ARN-89
4	Incorrect bearing in COMP mode	*a.* Faulty receiver R-1496A/ARN-89 *b.* Faulty loop antenna AS-2108A/ARN-89 *c.* Faulty sense antenna	*a.* Check receiver R-1496A/ARN-89 by substitution. Replace if faulty. *b.* Replace loop antenna AS-2108A/ARN-89 *c.* Replace sense antenna
5	No audio at any interphone stations	Faulty receiver R-1496A/ARN-89	Check receiver R-1496A/ARN-89 by substitution. Replace if faulty
6	No audio, one interphone station	*a.* Faulty COMM CONT C-6533/ARC *b.* Faulty headset or open wire between headset and C-6533/ARC	*a.* Check COMM CONT C-6533/ARC by substitution. Replace if faulty *b.* Refer to interphone facility troubleshooting (para 3-6)
7	Operating frequency not correct	*a.* Faulty receiver R-1496A/ARN-89 *b.* Faulty control C-7392A/ARN-89	*a.* Check receiver R-1496A/ARN-89 by substitution. Replace if faulty *b.* Check control C-7392A/ARN-89 by substitution. Replace if faulty
8	Bearing to transmitting station not displayed on either pilot's hsi	*a.* Faulty receiver R-1496A/ARN-89 *b.* Faulty control C-7392A/ARN-89 *c.* Faulty wiring	*a.* Check receiver R-1496A/ARN-89 by substitution. Replace if faulty *b.* Check control C-7392A/ARN-89 by substitution. Replace if faulty *c.* Check wiring (fig. FO-12 and 13)
9	Bearing to the transmitting station displayed on one pilot's hsi only	*a.* Faulty hsi *b.* Faulty mode select panel *c.* Faulty wiring	*a.* Check hsi by substitution. Replace if faulty *b.* Check mode select panel by substitution. Replace if faulty *c.* Check wiring (fig. FO-12 and 13)

3-12. VHF Navigation and Instrument Landing System Facility (AN/ARN-123) Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No power to receiver R-2023/ARN-123	*a.* Open circuit breakers	*a.* Close VOR circuit breakers
		b. Faulty receiver R-2023/ARN-123	*b.* Check for 26-volt ac at pin 18 on plug 192P10 of receiver R-2023/ARN-123. If voltage is present, replace R-2023/ARN-123 (fig. FO-14)
		c. Faulty control C-10048/ARN-123	*c.* Check for 28-volt dc at pin 6 on plug 192P1 of control C-10048/ARN-123. If voltage is present, replace C-10048/ARN-123 (fig. FO-14)
2	Course deviation bar does not center with VOR/MB TEST switch is at TEST and COURSE SET at 000°	*a.* Faulty control C-10048/ARN-123	*a.* Check control C-10048/ARN-123 by substitution. Replace if faulty
		b. Faulty receiver R-2023/ARN-123	*b.* Check receiver R-2023/ARN-123. Replace if faulty
		c. Faulty wiring	*c.* Check wiring (fig. FO-14)
3	Audio not heard at any interphone station	*a.* Faulty control C-10048/ARN-123	*a.* Check control C-10048/ARN-123 by substitution. Replace if faulty
		b. Faulty receiver R-2023/ARN-123	*b.* Check receiver R-2023/ARN-123 by substitution. Replace if faulty
4	Audio not heard at one interphone station	*a.* Faulty COMM CONT C-6533/ARC	*a.* Check COMM CONT C-6533/ARC by substitution. Replace if faulty
		b. Faulty headset, or open wire between headset and C-6533/ARC	*b.* Refer to interphone facility troubleshooting (para 3-6)
5	Marker beacon light and tone inoperative during test	*a.* Faulty receiver R-2023/ARN-123	*a.* Check receiver R-2023/ARN-123 by substitution. Replace if faulty
		b. Faulty control C-10048/ARN-123	*b.* Check control C-10048/ARN-123 by substitution. Replace if faulty
		c. Faulty rf cable or antenna	*c.* Check rf cable. If cable is not faulty, replace antenna
6	During glideslope test deviation bar fails to respond	*a.* Faulty receiver R-2023/ARN-123	*a.* Check receiver R-2023/ARN-123 by substitution. Replace if faulty
		b. Faulty rf cable or antenna	*b.* Check rf cable. If cable is not faulty, replace antenna
		c. Faulty control C-10048/ARN-123	*c.* Check control C-10048/ARN-123 by substitution. Replace if faulty
		d. Faulty wiring	*d.* Check wiring (fig. FO-14)
7	NAV flag on hsi fails to retract	*a.* Faulty hsi	*a.* Check hsi by substitution. Replace if faulty
		b. Faulty receiver R-2023/ARN-123	*b.* Check receiver R-2023/ARN-123 by substitution. Replace if faulty
		c. Faulty rf cable or antenna	*c.* Check rf cable. If cable is not faulty, replace antenna
8	No tone or received audio at one interphone station	*a.* Faulty wiring	*a.* Check for continuity between pin 15 on plug 192P10 of receiver-transmitter R-2023/ARN-123 and pin 14 on plug 18787 of the interphone junction box. Repair or replace wiring as required (fig. FO-15 and FO-16)
		b. Faulty COMM CONT C-6533/ARC	*b.* Refer to interphone facility troubleshooting (para 3-6)

3-13. Doppler Navigation Set AN/ASN-128A Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No output in any mode of operation	*a.* Open circuit breaker	*a.* Close DOPPLER circuit breakers
		b. No 28-volt dc to control indicator CP-1252/ASN-128	*b.* Check for 28-volt dc at pin C on plug 197P5 at control indicator CP-1252/ASN-128. If voltage is not present, check wiring. Repair or replace wiring as required (fig. FO-17)
		c. No 28-volt dc to signal data converter CV-3338/ASN-128	*c.* Check for 28-volt dc at pin W on plug 197P2 at signal data converter CV-3338/ASN-128. If voltage is not present, check wiring. Repair or replace wiring as required (fig. FO-17)
		d. No 26-volt ac to signal data converter CV-3338/ASN-128	*d.* Check for 26-volt ac at pin T on plug 197P2 at signal data converter CV-3338/ASN-128. If voltage is not present, check wiring. Repair or replace wiring as required (fig. FO-17)
2	GO does not appear on left display with MODE switch at TEST	*a.* Faulty control indicator CP-1252/ASN-128	*a.* Check control indicator CP-1252/ASN-128 by substitution. Replace if faulty
		b. Faulty wiring	*b.* Check wiring. Repair or replace as required (fig. FO-17)
3	MEM and MAL lights do not come on when MODE switch is at LAMP TEST	*a.* Faulty indicator lamps	*a.* Replace lamps
		b. Faulty control indicator CP-1252/ASN-128	*b.* Check control indicator CP-1252/ASN-128 by substitution. Replace if faulty

3-14. Directional Gyro AN/ASN-43 Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No power to gyro CN-998/ASN-43	*a.* Open circuit breaker	*a.* Close CMPS circuit breakers
		b. Faulty gyro CN-998/ASN-43	*b.* Check for 115-volt ac at pin C on plug 063P1 of gyro CN-998/ASN-43. If voltage is present, replace CN-998/ASN-43 (fig. FO-18)
2	No power to control C-8021/ASN-75	*a.* Open circuit breaker	*a.* Close CMPS circuit breaker
		b. Faulty control C-8021/ASN-75	*b.* Check for 26-volt ac at pin C on plug 063P2 of control C-8021/ASN-75. If voltage is present, replace C-8021/ASN-75 (fig. FO-18)
3	Compass control annunciator will not move	*a.* Faulty gyro CN-998/ASN-43	*a.* Check gyro CN-998/ASN-43 by substitution. Replace if faulty
		b. Faulty control C-8021/ASN-75	*b.* Check control C-8021/ASN-75 by substitution. Replace if faulty
4	Scale dial on hsi does not move but annunciator on control does move	Faulty hsi	Check hsi by substitution. Replace if faulty
5	Annunciator and scale dial move but final heading is incorrect	*a.* Gyro is synchronized to wrong null	*a.* Turn synchronizing knob clockwise until scale dial heading changes 180° and annunciator is centered
		b. Faulty gyro CN-998/ASN-43	*b.* Check gyro CN-998/ASN-43 by substitution. Replace if faulty
		c. Faulty hsi	*c.* Check hsi by substitution. Replace if faulty
		d. Faulty flux valve or remote compensator	*d.* Replace flux valve or remove compensator
6	Scale dial does not return to same indication ±1°	*a.* Faulty gyro CN-998/ASN-43	*a.* Check gyro CN-998/ASN-43 by substitution. Replace if faulty
		b. Faulty hsi	*b.* Check hsi by substitution. Replace if faulty
		c. Faulty flux valve or remote compensator	*c.* Replace flux valve or remote compensator
7	Compass slaves at wrong rate or does not slave	*a.* Faulty gyro CN-998/ASN-43	*a.* Check gyro CN-998/ASN-43 by substitution. Replace if faulty
		b. Faulty hsi	*b.* Check hsi by substitution. Replace if faulty
		c. Faulty flux valve or remote compensator	*c.* Replace flux valve or remote compensator
		d. Faulty wiring	*d.* Check wiring (fig. FO-19)

3-15. VGI Facility Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	Pilot's vgi OFF flag does not disappear and artificial horizon does not erect after power is applied	*a.* Open circuit breaker	*a.* Close PILOT VGI circuit breaker
		b No 115-volt ac to pilot's displacement gyro	*b.* Check for 115-volt ac at pins L, B, and S on plug 062P4 of pilot's gyro 9000F. If voltage is not present, check wiring. Repair or replace as required. If voltage is present, replace gyro (fig. FO-20)
2	Copilot's vgi OFF flag does not disappear and artificial horizon does not erect after power is applied	a. Open circuit breaker	*a.* Close COPLT VGI circuit breaker
		b. No 115-volt ac to copilot's displacement gyro	*b.* Check for 115-volt ac at pins L, B, and S on plug 062P3 of copilot's gyro 9000F. If voltage is not present, check wiring. Repair or replace as required. If voltage is present, replace gyro 9000F (fig. FO-20)
3	Copilot's vgi OFF flag does not disappear and artificial horizon does not erect when copilot's vgi switch is set at EMERG (COPLT VGI circuit breaker open)	*a.* No 115-volt ac to copilot's vgi	*a.* Check for 115-volt ac at pin B on plug 062P1 of copilot's vgi. If voltage is not present, check wiring. Repair or replace as required. If voltage is present, replace copilot's vgi (fig. FO-20)
		b. No 28-volt dc to gyro transfer relay assembly. Open CONT VGI circuit breaker	*b.* Close CONT VGI circuit breaker. Check for 28-volt dc at pin 23 on plug 062P5. If voltage is not present, check wiring through vgi switch to CONT VGI circuit breaker. Repair or replace wiring or parts as required (fig. FO-20)
4	Pilot OFF flag will not disappear	*a.* Open circuit breaker	*a.* Close circuit breaker
		b. Faulty pilot's relay 062K2	*b.* Check for 28-volt dc at pin X1 on relay 062K2. If voltage is not present check wiring from circuit breaker 062B1 to pin X1 on relay 062K2. Repair or replace wiring as required. If voltage is present replace relay 062K2 (fig. FO-20)
		c. Faulty wiring	*c.* Check wiring between 062K2-A2 and 062P6-7. Repair or replace wiring as required.
5	Copilot's OFF flag will not disappear	*a.* Open circuit breaker	*a.* Close circuit breaker
		b. Faulty copilot's relay 062K1	*b.* Check for 28-volt dc at pin X1 on relay 062K1. If voltage is not present check wiring from circuit breaker 062CB1 to pin X1 on relay 062K1. Repair or replace wiring as required. If voltage is present replace relay 062K1 (fig. FO-20)
		c. Faulty wiring	*c.* Check wiring between 062K1-A2 and 062P5-7. Repair or replace wiring as required.
6	Either or both vgi do not respond when pilot's gyro is tilted (copilot's vgi switch at EMERG)	Faulty transfer relay, vgi, vgi switch or gyro	If both vgi operate with copilot's gyro, pilot's gyro, vgi switch, or gyro transfer relay is probably faulty. If vgi fails to operate with either gyro, indicator is faulty. Replace units as required

3-15. VGI Facility Troubleshooting Chart (Continued)

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
7	Copilot's vgi OFF flag does not disappear and artificial horizon does not erect when copilot's vgi switch is set to NORM (pilot vgi circuit breaker open)	No 115-volt ac to copilot's vgi	Check for 115-volt ac at pin B on plug 062P1 of copilot's vgi. If voltage is not present, check wiring. Repair or replace as required (fig. FO-20)
8	Pilot's vgi OFF flag does not disappear and artificial horizon does not erect when pilot's VGI switch is at EMERG (pilot vgi circuit breaker open)	No 115-volts ac to pilot's vgi	Check for 115-volt ac at pin B on plug 062P2 of pilot's vgi. If voltage is not present, check wiring. Repair or replace as required (fig. FO-20)
9	Vgi oscillates	Faulty vgi	Check vgi by substitution. Replace if faulty
10	Incorrect vgi indication	*a.* Faulty gyro 9000F *b.* Faulty wiring	*a.* Check gyro 9000F by substitution. Replace if faulty *b.* Check wiring (fig. FO-21)

3-16. Radar Altimeter Facility AN/APN-209 Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	After warmup, both OFF flags remain in view and pointers remain behind dial mask	*a.* Open circuit breaker *b.* No 28-volt dc to pilot's indicators	*a.* Close RAD ALT circuit breaker *b.* Check for 28-volt dc at pin 9 on plug 195P1 of indicator receiver-transmitter RT-1115A/APN-209 and pin 1 on plug 195P5 of indicator ID-1917/APN-209. If voltage is not present, check wiring. Repair or replace wiring as required. If voltage is present, replace indicator (fig. FO-22)
2	One pointer does not move behind dial mask and OFF flag does not disappear	Faulty indicator	Check indicator by substitution. Replace if faulty
3	LO caution light does not come on	*a.* Faulty indicator RT-1115A/APN-29 or ID-1917/APN-209 *b.* Faulty wiring	*a.* Check indicator by substitution. Replace if faulty *b.* Check wiring between indicator RT-1115A/APN-209 and indicator ID-1917/APN-209. Repair or replace wiring as required (fig. FO-22)
4	Indicator does not indicate 900 to 1100 feet when PUSH-TO-TEST switch is pressed	Faulty indicator RT-1115A/APN-209 or ID-1917/APN-209	Check indicator by substitution. Replace if faulty
5	Both pointers remain behind the dial mask after warmup and indicate incorrectly when PUSH-TO-TEST switch is pressed	*a.* Faulty antenna *b.* Faulty antenna cable	*a.* Check by replacing one antenna. If trouble persists, replace other antenna *b.* Check by replacing one antenna cable. If trouble persists, replace other antenna cable
6	HI caution light does not come on when indicated altitude is above HI altitude index	Faulty indicator RT-1115A/APN-209 or ID-1917/APN-209	Check indicator by substitution. Replace if faulty
7	Known altitude is not indicated by indicator pointer and digital display	*a.* Faulty indicator RT-1115A/APN-209 or ID-1917/APN-209 *b.* Faulty antenna	*a.* Check indicator by substitution. Replace if faulty *b.* Check antenna by substitution. Replace if faulty

3-17. Transponder Set (IFF) AN/APX-100 Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	No output in any mode	*a.* Open circuit breaker	*a.* Close IFF circuit breaker
		b. Faulty receiver-transmitter RT-1285/APX-100	*b.* Check for 28-volt dc at pins 25 and 26 on plug 185P1 of receiver-transmitter RT-1285/APX-100. If voltage is not present, check wiring. Repair or replace wiring as required. If voltage is present, replace RT-1285/APX-100 (fig. FO-23)
		c. Faulty fuse in RT-1285/APX-100	*c.* Check and replace fuse in RT-1285/APX-100
2	Indication weak or intermittent in any mode	*a.* Power supply in RT-1285/APX-100 abnormal	*a.* Check receiver-transmitter RT-1285/APX-100 by substitution. Replace if faulty
		b. Receiver-transmitter RT-1285/APX-100 coder operations abnormal	*b.* Check receiver-transmitter RT-1285/APX-100 by substitution. Replace if faulty
3	Improper response in one mode. All others normal	Faulty receiver-transmitter RT-1285/APX-100	Check receiver-transmitter RT-1285/APX-100 by substitution. Replace if faulty
4	STATUS ANT light comes on in self-test mode	*a.* Faulty antenna cable or connector	*a.* Check antenna cable and connector. Repair or replace as required
		b. Faulty receiver-transmitter RT-1285/APX-100	*b.* Check receiver-transmitter RT-1285/APX-100 by substitution. Replace if faulty
5	STATUS KIT light comes on in mode 4	*a.* Faulty computer KIT-1A/TSEC	*a.* Check computer KIT-1A/TSEC by substitution. Replace if faulty
		b. Faulty receiver-transmitter RT-1285/APX-100	*b.* Check receiver-transmitter RT-1285/APX-100 by substitution. Replace if faulty
		c. Faulty wiring	*c.* Check wiring. Repair or replace as required (fig. FO-23)
6	STATUS ALT light comes on	*a.* Faulty altimeter encoder	*a.* Check altimeter encoder by substitution. Replace if faulty
		b. Faulty receiver-transmitter RT-1285/APX-100	*b.* Check receiver-transmitter RT-1285/APX-100 by substitution. Replace if faulty
7	No tone or received audio at one interphone station	*a.* Faulty wiring	*a.* Check for continuity between pin 21 on plug 185P1 of receiver-transmitter RT-1285/APX-100 and pin 1 on plug 187P7 of the interphone junction box. Repair or replace wiring as required (fig. FO-24)
		b. Faulty COMM CONT C-6533/ARC	*b.* Refer to interphone facility troubleshooting (para 3-6)

3-18. Detecting Set, Radar Signal AN/APR-39 Troubleshooting Chart

SEQUENCE NO.	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	Fwd and aft strobes not on indicator when SELF-TEST switch is pressed	*a.* Open circuit breaker *b.* Faulty control C-9326/APR-39 *c.* Faulty comparator CM-440/APR-39	*a.* Close RAD WARN circuit breaker *b.* Check for 28-volt dc at pin 12 on plug 201P2 of control C-9326/APR-39. If voltage is present, replace C-9326/APR-39. If voltage is not present, check wiring. Repair or replace wiring as required (fig. FO-25) *c.* Check comparator CM-440/APR-39 by substitution. Replace if faulty
2	Audio alarm is not heard and MA light does not flash when SELF-TEST switch is pressed	*a.* Faulty control C-9326/APR-39 *b.* Faulty indicator IP-1150/APR-39	*a.* Check control C-9326/APR-39 by substitution. Replace if faulty *b.* Check indicator IP-1150/APR-39 by substitution. Replace if faulty
3	No indicator strobe and only MA audio present	Faulty indicator IP-1150/APR-39	Check indicator IP-1150/APR-39 by substitution. Replace if faulty
4	No indicator strobe and all audio present	*a.* Faulty indicator IP-1150/APR-39 *b.* Faulty comparator CM-440/APR-39	*a.* Check indicator IP-1150/APR-39 by substitution. Replace if faulty *b.* Check comparator CM-440/APR-39 by substitution. Replace if faulty
5	MA light flashes only when SELF-TEST switch is released	Faulty comparator CM-440/APR-39	Check comparator CM-440/APR-39 by substitution. Replace if faulty
6	No tone or received audio at one interphone station	*a.* Faulty wiring *b.* Faulty COMM CONT C-6533/ARC	*a.* Check for continuity between pin 14 on plug 201P2 of control C-9326/APR-39 and pin 24 on plug of the interphone junction box. Repair or replace wiring as required (fig. FO-26) *b.* Refer to interphone facility troubleshooting (para 3-6)

3-19. Countermeasures Set AN/ALQ-156 Troubleshooting Chart

SEQUENCE NO	SYMPTOM	PROBABLE TROUBLE	CORRECTION
1	WARMUP light does not come on when POWER switch is set at ON	*a.* Open circuit breaker	*a.* Close MSL DET SYS circuit breaker
		b. No 28-volt dc to receiver-transmitter RT-1220/ALQ-156	*b.* Check for 28-volt dc at pin J on plug 202P1 of receiver-transmitter RT-1220/ALQ-156. If voltage is not present, check wiring. Repair or replace wiring as required (fig. FO-27)
		c. No 115-volt ac to receiver-transmitter RT-1220/ALQ-156	*c.* Check for 115-volt ac at pins A, B, and C on plug 202P1 of receiver-transmitter RT-1220/ALQ-156. If voltage is not present, check wiring. Repair or replace wiring as required (fig. FO-27)
2	WARMUP light does not go out after 10 minutes	*a.* Faulty receiver-transmitter RT-1220/ALQ-156	*a.* Check receiver-transmitter RT-1220/ALQ-156 by substitution. Replace if faulty
		b. Faulty indicator C-10131/ALQ-156	*b.* Check indicator C-10131/ALQ-156 by substitution. Replace if faulty
3	Antenna indicator on receiver-transmitter comes on	Faulty antenna AS-3149/ALQ-156 or receiver-transmitter RT-1220/ALQ-156	Check FWD and AFT indicators on receiver-transmitter. Note which indicator is on. Set POWER switch to OFF. Unplug antenna cables from receiver-transmitter. Reconnect AFT plug to FWD receptacle and FWD plug to AFT receptacle. Set POWER switch to ON. Press STBY switch. If same indicator comes on, replace receiver-transmitter. If opposite indicator comes on set POWER switch to OFF. Reconnect AFT antenna plug to AFT receptacle and FWD antenna plug to FWD receptacle. Set POWER switch to ON. Press STBY switch. If original light comes on, replace antenna or antenna cable

3-20. Terminal Board Charts

Terminal board charts for each signal electronic facility are in para 3-21 thru 3-30. The charts list the function and voltage (where applicable) of each terminal for each facility. Power voltages are listed. Audio voltages are indicated, but values are not listed because their values depend upon individual volume control settings and microphone audio levels. The locations of terminal boards are shown in TM 11-1520-240-20. If trouble develops in a particular facility and the troubleshooting charts in TM 11-1520-240-20 do not give the source of trouble, refer to the charts and check voltages at the applicable terminals. If the measured voltage does not agree with the specified voltage for the particular terminal, refer to the troubleshooting charts in para 3-6 thru 3-19, the related service diagrams, and the wiring diagrams in TM 11-1520-240-20. Trace the wiring to the power source, basic signal equipment, or electronic equipment unit to locate the fault. External power must be connected and the equipment turned on to measure voltages.

NOTE

> The control circuits press-to-talk, frequency selection are keyed in their negative return lines. The other side of each relay winding is connected to a 28-volt dc source. Therefore, a 28-volt dc potential is present between the control side of the relay winding and ground until the control circuit is closed by its related switch. The potential will then be zero.

3-21. Interphone Facility

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB4	4 ABC	Power (28 vdc) to copilot's COMM CONT	INTPH LH circuit breaker closed	28 vdc
	4 DE	Ground		Ground
	5 KLM	Ground		Ground
	6 ABCD	Power (28 vdc) to pilot's and troop commander's COMM CONT	INTPH RH circuit breaker closed	28 vdc
TB27	4 ABCD	Audio from aft COMM CONT	Interphone facility operating, p/t switch pressed	Audio
	4 GHJK	Audio from aft COMM CONT to ground crew and hoist operator	Interphone facility operating, p/t switch pressed	Audio
	5 ABCD	Wire shield ground		0
	5 GHJK	Wire shield ground		0
	6 ABCD	Audio from aft COMM CONT	Interphone facility operating, p/t switch pressed	Audio
	6 GHJK	Audio from aft COMM CONT	Interphone facility operating, p/t switch pressed	Audio
	7 ABCDE	Audio output to hoist operator and ground crew	Interphone facility operating, p/t switch pressed	0
	7 GHJKLM	Audio (common for C-6533/ARC)	Interphone facility operating, p/t switch pressed	0

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB29	1 ABC	Wire shield ground		0
	1 DEF	Audio to aft station	Interphone facility operating, p/t switch pressed	Audio
	1 GHJ	Audio (mike output from aft COMM CONT)	Interphone facility operating, p/t switch pressed	Audio
	1 KLM	Audio (from aft, hoist operator, and ground crew headset)	Interphone facility operating	Audio
	2 ABC	Audio (to aft station headset)	Interphone facility operating	Audio
	2 DEF	Power (28 vdc)	P/t switch pressed	0
	2 GHJ	Key common	P/t switch pressed	0
	2 KLM	Wire shield ground		0
	3 A thru M	Audio common	Interphone facility operating p/t switch pressed	0
	4 AB	Audio (ICS output aft and left external station)	Interphone facility operating, p/t switch pressed	Audio
	4 DE	Audio (No. 1 AN/ARC-186 output to aft and external stations)	Interphone circuit breakers closed. Receiver switch 1 at ON	Audio
	4 GH	Audio (AN/ARC-164 output to aft and external stations)	Interphone circuit breakers closed. Receiver switch 2 at ON	
	4 KL	Audio (No. 2 AN/ARC-186 output to aft and external stations)	Interphone circuit breakers closed. Receiver switch 3 at ON	
	5 AB	Audio (AN/ARC-102 output to aft and external stations)	Interphone circuit breakers closed. Receiver switch 4 at ON	Audio
	5 DEF	Wire shield ground		0
	5 GH	Audio (marker beacon output to aft and external station)	Interphone circuit breakers closed	Audio
	5 KL	Audio (Radar warning output to aft and external stations)	Interphone circuit breakers closed	

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB29 (Cont)	6 AB	Audio (VOR output to aft and external stations)	Interphone circuit breakers closed. Receiver switch AUX at ON	Audio
	6 DE	Audio (ADF output to aft and external stations)	Interphone circuit breakers closed. Receiver switch NAV at ON	
	6 GH	Audio (IFF output to aft and external stations)	Interphone circuit breakers closed	
	6 KLM	Wire shield ground		0
TB30	1 A thru M	Audio common	Interphone facility operating, p/t switch pressed	0
	2 AB	Audio ICS to right gunner interphone station	Interphone circuit breakers closed	Audio
	2 DEF	Wire shield ground		0
	2 GH	Audio (No. 1 AN/ARC-186 output to right gunner station)	Interphone circuit breakers closed. Receiver switch 1 at ON	Audio
	2 KL	Audio (AN/ARC-164 output to right gunner station)	Interphone circuit breakers closed. Receiver switch 2 at ON	Audio
	3 AB	Audio (No. 2 AN/ARC-186 output to right gunner station)	Interphone circuit breakers closed. Receiver switch 3 at ON)	
	3 DE	Audio (AN/ARC-102 output to right gunner station)	Interphone circuit breakers closed. Receiver switch 4 at ON	
	3 GH	(Spare)		
	3 KLM	Wire shield ground		0
	4 AB	Audio (marker beacon output to right gunner station)	Interphone circuit breakers closed	Audio
	4 DE	Audio (radar warning output to right gunner station)	Interphone circuit breakers closed	
	4 GH	Audio (vor output to right gunner station)	Interphone circuit breakers closed. Receiver switch AUX at ON	
	4 KL	Audio (adf output to right gunner station)	Interphone circuit breakers closed. Receiver switch NAV at ON	Audio

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB 30 (Cont)	5 AB	Audio (IFF output to right gunner station)	Interphone circuit breakers closed	Audio
	5 DEF	Wire shield ground		
TB31	1 A thru M	Audio common	Interphone facility operating, p/t switch pressed	0
	2 AB	Audio ICS to left gunner interphone station	Interphone circuit breakers closed	Audio
	2 DEF	Wire shield ground		0
	2 GH	Audio (No. 1 AN/ARC-186 output to left gunner station)	Interphone circuit breakers closed. Receiver switch 1 at ON	Audio
	2 KL	Audio (AN/ARC-164 output to left gunner station)	Interphone circuit breakers closed. Receiver switch 2 at ON	
	3 AB	Audio (No. 2 AN/ARC-186 output to left gunner station)	Interphone circuit breakers closed. Receiver switch 3 at ON	Audio
	3 DE	Audio (AN/ARC-102 output to left gunner station)	Interphone circuit breakers closed. Receiver switch 4 at ON	
	3 GH	(Spare)		
	3 KLM	Wire shield ground		0
	4 AB	Audio (marker beacon output to left gunner station)	Interphone circuit breakers closed	Audio
	4 DE	Audio (radar warning output to left gunner station)	Interphone circuit breakers closed	
	4 GH	Audio (vor output to left gunner station)	Interphone circuit breakers closed. Receiver switch AUX at ON	
	4 KL	Audio (adf output to left gunner station)	Interphone circuit breakers closed. Receiver switch NAV at ON	
	5 AB	Audio (IFF output to left gunner station)	Interphone circuit breakers closed	Audio
	5 DEF	Wire shield ground		0

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB52	9 AB	Audio (No. 1 AN/ARC-186 output to pilot's station)	Interphone circuit breakers closed. Receiver switch 1 at ON	Audio
	9 DE	Audio (No. 1 AN/ARC-186 output to copilot's station)	Interphone circuit breakers closed. Receiver switch 1 at ON	
	10 AB	Audio common	Interphone facility operating, p/t switch pressed	0
TB201	1, 2	Audio (MIC output from troop commander's station)	Interphone circuit breakers closed. P/t switch pressed	Audio
	3, 4	Wire shield ground		0
	5, 6	Audio (output to troop commander headset)	Interphone circuit breakers closed	Audio
	7, 8	P/t line for troop commander	Troop commander p/t switch pressed	0

3-22. VHF AM/FM Facility

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB6	2 BCD	Power (28 vdc) to cipher lights	KY-28 on	28 vdc
	5 BCD	Power (28 vdc) to cipher lights	Press-to-test cipher lights	28 vdc
TB7	1 ABCGH	Wire shield ground		0
	2 ABCD	Audio low from No. 1 VHF AM/FM RT to KY-28	VHF AM/FM and KY-28 on	Signal
	4 ABC	Power (28 vdc) from control C-8157/ARC	KY-28 on	28 vdc
	4 DEF	Audio high from No. 1 Receiver-Transmitter RT-354/ARC-186 to KY-28	VHF AM/FM and KY-28 on	Signal
TB8	6 DEF 9 AF	Power (28 vdc) from control C-8157/ARC	Control switch at PLAIN	28 vdc
TB17	7 GHJK	Power (28 vdc) to cipher light	Press-to-test KY-28 circuit breaker closed	28 vdc
TB52	8 GH	Audio from No. 1 Receiver-Transmitter RT-1354/ARC-186 to interphone system	VHF No. 1 AM/FM on	Signal

3-23. Hf Facility AN/ARC-102

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB11	2 ABC	Power (28 vdc) to receiver-transmitter	HF circuit breaker closed	28 vdc
	2 DE	Power (115 vac) to receiver-transmitter	HF circuit breaker closed	115 vac
	2 KL	Wire shield ground		0
TB13	5, 9	Hf key line to receiver-transmitter	HF circuit breakers closed	
TB62	6	Power (28 vdc) to 184A3TB2 and receiver-transmitter	HF circuit breaker closed	28 vdc
184A3TB2	3, 4, 5, 6, 7 8, 9, 10	Power (28 vdc) to receiver-transmitter	HF circuit breaker closed	28 vdc

3-24. ADF Facility AN/ARN-89B

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB11	1 AB	Wire shield ground		0
	1 DE	Power (26 vac) to Receiver R-1496/ARN-89	ADF circuit breaker closed	26 vac
	4 KM	Power (28 vdc) to Receiver R-1496/ARN-89	ADF circuit breaker closed	28 vdc

3-25. VOR/ILS Facility AN/ARN-123

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB11	3 AB	Power (26 vac) to Receiver R-2023/ARN-123	VOR circuit breaker on	26 vac

3-26. Doppler Navigation Facility AN/ASN-128A

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB7	6 GH	Power (28 vdc) to control indicator CP-1252/ASN-128	DOPPLER circuit breaker closed. CAUTION light switch at DIM	28 vdc
	8 GHJ	Power (28 vdc) to Control Indicator CP-1252/ASN-128	DOPPLER circuit breaker closed. CAUTION LIGHT DIM/BRIGHT switch at BRIGHT	28 vdc

3-27. Gyro Magnetic Compass AN/ASN-43

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB11	6 ABGH	Heading signals from compass control to pilots' hsi	AN/ASN-43 on	Signal
	7 AB	Heading signals from compass control to pilots' hsi	AN/ASN-43 on	Signal
TB15	6 ABC GHJ	Heading signals from Directional Gyro CN-998/ASN-43 to compass control	AN/ASN-43 on	Signal
TB17	8 ADGK	Power (40 vdc) Directional Gyro CN-998/ASN-32 to Compass Control C-8021/ASN-75	CMPS circuit breaker closed	40 vdc

3-28. VGI Facility

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB8	4 KLM	Power (115 vac) to VGI switch	PILOT VGI circuit breaker closed	115 vac
	5 ABC	Power (115 vac) to VGI switch	COPLT VGI circuit breaker closed	115 vac
	5 GHJ	Power (28 vdc) to VGI switch	CONT VGI circuit breaker closed	28 vdc
TB11	9 ABC	Wire shield ground		0
	9 DEFGH JKL	Pitch synchro signals to pilot's attitude indicator and No. 2 AFCS computer	Voltage only when CN-811A/ASN is displaced	
	10 ABCDEF	Roll synchro signals to copilot's attitude indicator and No. 2 AFCS computer	Voltage only when CN-811A/ASN is displaced	
	10 KLM	Wire shield ground		0
TB15	1 ABCDE	Power (115 vac) to pilot's gyro	PILOT VGI circuit breaker closed	115 vac
	1 HJKL	Pitch synchro signals to copilot's attitude indicator, signal data converter and NO. 1 AFCS	Voltage only when CN-811/ASN is displaced	Signal
	2 ABCDE	Power (115 vac) to copilot's gyro	COPLT VGI circuit breaker closed	115 vac

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB15 (Cont)	2 HJK	Pitch synchro signals to copilot's attitude indicator and Signal Data Converter	Voltage only when CN-811/ASN is displaced	Signal
	3 BCDE	Pitch synchro signals to copilot's attitude indicator, signal data converter, and No. 1 AFCS	Voltage only when CN-811/ASN is displaced	
	3 GHJK	Wire shield ground		0
	4 ACDE HJKL	Roll synchro signals to copilot's attitude indicator, signal data converter and No. 1 AFCS	Voltage only when CN-811/ASN is displaced	Signal
	5 BCDE	Roll Synchro signals to copilot's attitude indicator, signal data converter and No. 1 AFCS		
	5 GHJK	Wire shield ground		0

3-29. Radar Altimeter AN/APN-209

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB6	1 ABCDE	Power (28 vdc)	RAD ALT circuit breaker closed	28 vdc
	3 ABC	Self-test signal to No. 1 AFCS computer	RAD ALT circuit breaker closed	
	3 DEF	Push-to-test signal to No. 1 AFCS computer	RAD ALT circuit breaker closed	
	3 GHJ	Signal ground		Ground
	3 KLM	Reliability signal to No. 1 AFCS computer	RAD ALT circuit breaker closed	
	4 ABC	Altitude signal to No. 1 AFCS computer	RAD ALT circuit breaker closed	
	4 DEF	Wire shield ground		0

3-30. Transponder Set (IFF) AN/APX-100

TERMINAL BOARD	MODULE/PINS	TERMINAL FUNCTION	OPERATION OF EQUIPMENT	VOLTAGE
TB17	6 GH	Signal to proximity switch relay (right landing gear)	IFF circuit breaker closed	

SECTION III ELECTRONIC INSTALLATION ITEMS

3-31. Scope.

The circuit functions and the troubleshooting procedures for the electronic installation items are in para 3-33 thru 3-37.

3-32. Troubleshooting.

The troubleshooting procedures in this chapter, together with the facility troubleshooting charts and terminal board voltage charts in Section I provide all data needed for rapid and effective troubleshooting.

3-33. Localizing and Isolating Troubles.

Localize and isolate trouble in signal installation items by correlating the symptoms to the operational checks in TM 11-1520-240-20 and testing procedures in Chapter 4 for the facility requiring maintenance. Refer to the troubleshooting charts in Section I for the signal installation item suspected of being faulty and to the service diagrams for the power and control and audio output circuits of the faulty facility. Refer to the terminal board voltage measurements in Section I for the applicable facility.

3-34. Interphone Junction Box.

a. The interphone junction box is the central connecting point for all of the interphone stations and associated avionics systems. The box contains 10 receptacles, J1 thru J10, 5 terminal boards TB1 thru TB5, 10 resistors R1 thru R10, and 1 capacitor.

b. Resistive audio networks attenuate the output of all receivers to a level suitable for driving the C-6533/ARC headset amplifiers. Resistive audio networks attenuate all microphone audio input to the communication transmitters. A capacitor in the interphone junction box interconnect the warning tone from detecting set, radar signal AN/APR-39, to the headsets.

3-35. Troubleshooting Interphone Junction Box (Table 3-1, fig. FO-30).

Usually an interphone junction box fault will involve only one of its audio network circuits. Select the faulty circuit from table 3-1 and perform the continuity checks as shown. Figure FO-30 is the wiring diagram for the interphone junction box.

Table 3-1. Interphone junction box continuity checks

SYSTEM	CIRCUIT BEING CHECKED	MULTIMETER CONNECTIONS FOR CONTINUITY CHECKS
INTERPHONE SYSTEM	KEY	J2-3 to J2-4 (PILOT)
	COMMON	J2-5 to J2-6 (PILOT)
	AUDIO	J1-10 to J2-10, J3-2, J4-2, J5-10, J6-2
	COMMON	J1-11 to J2-11, J3-1, J4-1, J5-11, J6-1 J1-10 to J1-11: thru R2, 3000 ohms
	KEY	J1-3 to J1-4 (COPILOT)
	COMMON	J1-5 to J1-6 (COPILOT)
RADIO	KEY	J2-1 - J2-2 (PILOT) J1-1 - J1-2 (COPILOT)
NO. 1 VHF AM/FM AN/ARC-186	KEY	J8-27 to J1-16, J2-16, J5-16
	AUDIO	J9-5 to J9-15, J9-18, J9-24
	COMMON	J9-6 to J9-16, J9-19, J9-25
	TRANSMIT	J10-1 to J10-4, J10-7, J10-10
	COMMON	J10-2 to J10-5, J10-8, J10-11

Table 3-1. Interphone Junction Box Continuity Checks (Continued)

SYSTEM	CIRCUIT BEING CHECKED	MULTIMETER CONNECTIONS FOR CONTINUITY CHECKS
NO. 2 VHF AM/FM AN/ARC-186	KEY	J8-24 to J2-24 (PILOT) J8-21 to J1-24 (COPILOT)
	AUDIO	J7-9 to J1-22, J2-22, J3-11, J4-11, J5-22, J6-11
	COMMON	J7-8 to J1-21, J2-21, J3-10, J4-10, J5-21, J6-10 J7-8 to J7-9: thru R5, 150 ohms
	TRANSMIT	J8-5 to J1-49, J2-49
	COMMON	J8-6 to J1-48, J2-48
UHF AM AN/ARC-164	KEY	J8-23 to J2-20 (PILOT) J8-20 to J1-20 (COPILOT)
	AUDIO	J7-6 to J2-18, J1-18, J3-8, J4-8, J5-18, J6-8
	COMMON	J7-5 to J2-17, J1-17, J3-7, J4-7, J5-17, J6-7 J7-5 to J4-8: thru R4, 150 ohms
	TRANSMIT	J8-3 to J2-46, J1-46
	COMMON	J8-2 to J2-45, J1-45
HF AN/ARC-102	KEY	J8-25 to J2-28 (PILOT) J8-22 to J1-28 (COPILOT) J8-19 to J5-28 (TROOP COMMANDER)
	AUDIO	J7-11 to J2-26, J1-26, J3-14, J4-14, J5-26, J6-14 thru R6, 150 ohm
	COMMON	J7-12 to J2-25, J1-25, J3-13, J4-13, J5-25, J6-13 J3-13 to J3-14: thru R7, 150 ohms
	TRANSMIT	J8-8 to J2-52, J1-52, J5-52
	COMMON	J8-9 to J2-51, J1-51, J5-51
ADF AN/ARN-89	AUDIO	J7-20 to J1-39, J2-39, J3-29, J4-29, J5-39, J6-29
	COMMON	J7-21 to J1-38, J2-38, J3-28, J4-28, J5-38, J6-28 J7-20 to J7-21: thru R10, 150 ohms
VOR/ILS AN/ARN-123	AUDIO (VOR/LOC)	J7-14 to J1-35, J2-35, J3-25, J4-25, J5-35, J6-25
	COMMON	J7-15 to J1-36, J2-36, J3-26, J4-26, J5-36, J6-26 J7-14 to J7-15: (R8) 150 ohms
	AUDIO (MKR BCN)	J7-17: to J1-32, J2-32, J3-20, J4-20, J5-32, J6-20
	COMMON	J7-18 to J1-33, J2-33, J3-19, J4-19, J5-33, J6-19 J7-17 to J7-18: thru R9, 150 ohms
IFF AN/APX-100	AUDIO	J7-1 to J1-8, J2-8, J3-32, J4-32, J5-8, J6-32
	COMMON	J7-2 to J2-9, J1-9, J3-31, J4-31, J5-9, J6-31 J7-1 to J7-2: thru R1, 150 ohms
RADAR SIGNAL AN/APR-39	WARNING TONE	J7-24 to J1-29, J2-29, J3-22, J4-22, J5-29, J6-22
	COMMON	J7-23 to J1-30, J2-30, J3-23, J4-23, J5-30, J6-23 J5-29 to J5-30: thru R5, 150 ohms J5-29 to J7-24: (C1) 100 UF

3-36. Gyro Transfer Relay.

The gyro transfer relay contains four relay circuits that enable the operation of both attitude indicators from the pilot's or copilot's vgi system.

3-37. Troubleshooting, Gyro Transfer Relay (fig. 3-1).

Troubleshooting of the gyro transfer relay is performed by continuity checks only. Figure 3-1 is the wiring diagram for the gyro transfer relay.

a. Using a multimeter, perform the continuity checks below.

CONNECTOR	MULTIMETER CONNECTION	CONNECTOR	MULTIMETER CONNECTION
J5	Pin 1-8	J6	Pin 1-8
	2-9		2-9
	3-10		3-10
	4-11		4-11
	5-12		5-12
	6-13		6-13
	7-14		7-14

b. Connect 28-volt dc to pins 23 and 24 on connector J5 and perform the continuity checks below.

MULTIMETER CONNECTIONS	
J6-1 to J6-8	J6-1 to J5-8
J6-2 to J6-9	J6-2 to J5-9
J6-3 to J6-10	J6-3 to J5-10
J6-4 to J6-11	J6-4 to J5-11
J6-5 to J6-12	J6-5 to J5-12
J6-6 to J6-13	J6-6 to J5-13
J6-7 to J6-14	J6-7 to J5-14

c. Disconnect 28-volt dc from pins 23 and 24 on connector J5 and connect it to pins 23 and 24 on connector J6. Perform the continuity checks below.

MULTIMETER CONNECTIONS	
J5-1 to J5-8	J5-1 to J6-8
J5-2 to J5-9	J5-2 to J6-9
J5-3 to J5-10	J5-3 to J6-10
J5-4 to J5-11	J5-4 to J6-11
J5-5 to J5-12	J5-5 to J6-12
J5-6 to J5-13	J5-6 to J6-13
J5-7 to J5-14	J5-7 to J6-14

3-38. HSI Mode Select Panel.

a. the HSI MODE SELECT panel allows the pilot to select the navigation facility output displayed on the hsi and to command afcs heading select. The panel visually indicates marker beacon passage. The panel is divided into three sections marked CRS, BRG, and MKR BCN.

b. The CRS (course) section consists of four pushbutton selector switches marked VOR SEL, DOP SEL, FM SEL, and CMD SEL. Pressing VOR SEL, DOP SEL, or FM SEL causes the output of the selected navigation set to be electrically connected to the course pointer on the corresponding hsi and lights SEL legend in the switch. These switches are electrically interlocked so only one set can be selected at a time. Selecting another navigational mode, automatically disengages the mode in use, turns out the SEL legend of the mode in use, engages the selected mode, and lights the SEL legend of the selected mode. Each pilot may indepenedently select different navigational modes for display on his hsi.

c. Pressing CMD SEL engages afcs heading select feature, causes the helicopter to turn to and maintain heading to which the hsi heading bug is set, and illuminates the SEL legend on the switch. Electrical interlocks prevent both pilots from selecting headings at the same time. If both buttons are pressed, the helicopter will turn to the bug heading of the last selected hsi and the SEL legend on the opposite button will go out.

d. Pressing VOR/ADF pushbutton on the BRG side selects the navigational aid, the bearing of which will be indicated by the hsi No. 2 pointer. The switch is divided into two segments marked VOR and ADF. If the VOR segment is lit, pressing the switch will cause the VOR segment to go out and the No. 2 pointer will indicate the bearing to the station to which the ADF set is tuned out and light the ADF segment. The opposite action occurs if the ADF segment is lit and the switch is pressed. The No. 2 pointer will indicate the bearing to a VOR station to which the VHF navigation set is tuned.

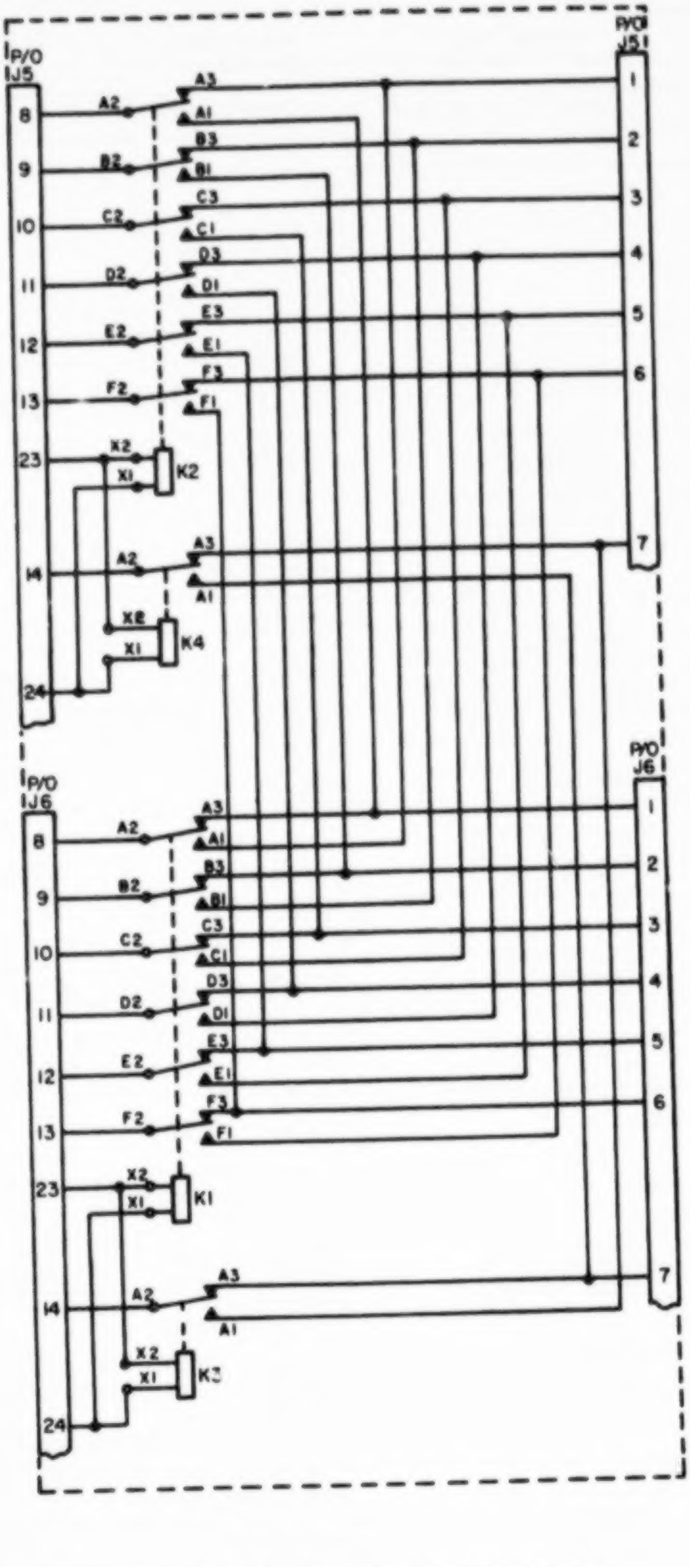
e. A MKR BCN light will come on during marker beacon passage. The light marked O glows blue when passing thru an outer marker beam. The light marked M glows amber when passing thru a middle marker and finally the light marked I glows white when passing thru an inner marker. As each light glows, a distinctive tone identifying the beacon will be heard over the interphone. The lights have a press-to-test feature; pressing any one of the three lamps will cause all MKR BCN lamps to light plus the SEL segments of the mode select pushbuttons on both pilots HSI mode select panels.

f. The HSI MODE SELECT panel (145E3134-1) includes 22 relays, five terminal modules, five switches, a switch assembly, 15 resistors, four diodes, a capacitor, two receptacles, and a timing module.

g. The HSI MODE SELECT panel (145E3134-2 and -4) includes five switches, a switch assembly, two receptacles and three printed circuit boards.

3-39. Troubleshooting HSI Mode Select Panel. (Table 3-2, fig. FO-31, and fig. 4-5).

Usually a mode select panel fault will involve only one of its avionics circuits. Select the faulty circuit from table 3-2 and perform the continuity checks as shown. Figure FO-31 is the wiring diagram for the mode select panel.


P/O J5
P/O J5
P/O J6
P/O J6
8
9
10
11
12
13
23
14
24
1
2
3
4
5
6
7
A2
A3
A1
B2
B3
B1
C2
C3
C1
D2
D3
D1
E2
E3
E1
F2
F3
F1
X2
X1
K1
K2
K3
K4

ELBPH035

Figure 3-1. Gyro transfer relay wiring diagram

Table 3-2. Mode Select Panel Continuity Checks

CIRCUIT	PUSHBUTTON SWITCH POSITION	MULTIMETER CONNECTIONS	REMARKS
28VDC POWER		28VDC J2-48 to J2-19	Connect 28vdc. J2-47 (+) and J2-48
INTERLOCK		J2-51 to J2-53	
CHASSIS GROUND		J2-31 to J1-3	
		J2-31 to J1-13	
		J2-31 to J1-16	
		J2-31 to J1-19	
		J2-31 to J1-22	
		J2-31 to J1-25	
		J2-31 to J1-28	
VOR RESOLVER		J2-32 to J1-29	
	CMD SEL to SEL	J2-33 to J1-40	Connect 28vdc. J2-47 (+) and J2-48
	CMD SEL to SEL	J2-34 to J1-41	Connect 28vdc. J2-47 (+) and J2-48
		J2-35 to J1-30	
	CMD SEL to SEL	J2-36 to J1-39	Connect 28vdc. J2-47 (+) and J2-48
	CMD SEL to SEL	J2-37 to J1-38	Connect 28vdc. J2-47 (+) and J2-48
	CMD SEL to SEL	J2-38 to J1-35	Connect 28vdc. J2-47 (+) and J2-48
	CMD SEL to SEL	J2-39 to J1-37	Connect 28vdc. J2-47 (+) and J2-48
	CMD SEL to SEL	J2-40 to J1-36	Connect 28vdc. J2-47 (+) and J2-48
		J2-41 to J1-31	
VOR		J2-21 to J1-32	
		J2-22 to J1-33	
		J2-23 to J1-34	
ADF	VOR ADF to ADF	J2-42 to J1-34	Connect 28vdc. J2-47 (+) and J2-48
	VOR ADF to ADF	J2-43 to J1-32	Connect 28vdc. J2-47 (+) and J2-48
	VOR ADF to ADF	J2-44 to J1-33	Connect 28vdc. J2-47 (+) and J2-48
DOPPLER NAV FLAG		J2-1 to J2-2 thru R6, 1 K ohm.	
	DOP SEL to SEL	J2-1 to J1-27	Connect 28vdc. J2-47 (+) and J2-48
	DOP SEL to SEL	J2-2 to J1-26	Connect 28vdc. J2-47 (+) and J2-48
DOPPLER DEVIATION		J2-3 to J2-4: thru R7, 1 K ohm	
	DOP SEL to SEL	J2-3 to J1-17	Connect 28vdc. J2-47 (+) and J2-48
	DOP SEL to SEL	J2-4 to J1-18	Connect 28vdc. J2-47 (+) and J2-48
GLIDE SLOPE DEVIATION		J2-5 to J2-6: thru R5, 1 K ohm	
	VOR SEL to SEL	J2-5 to J1-23	Connect 28vdc. J2-47 (+) and J2-48
	VOR SEL to SEL	J2-6 to J1-24	Connect 28vdc. J2-47 (+) and J2-48
GLIDE SLOPE FLAG		J2-7 to J2-8: thru R4, 1 K ohm	
	VOR SEL to SEL	J2-7 to J1-21	Connect 28vdc. J2-47 (+) and J2-48
	VOR SEL to SEL	J2-8 to J1-20	Connect 28vdc. J2-47 (+) and J2-48
VOR/LOC FLAG		J2-9 to J2-10: thru R1, 1 K ohm	
	VOR SEL on	J2-9 to J1-27	Connect 28vdc. J2-47 to J2-48
	VOR SEL on	J2-10 to J1-26	Connect 28vdc. J2-47 to J2-48
VOR/LOC DEVIATION		J2-11 to J2-12: thru R2, 1 K ohm	
	VOR SEL on	J2-11 to J1-17	Connect 28vdc. J2-47 to J2-48
	VOR SEL on	J2-12 to J1-18	Connect 28vdc. J2-47 to J2-48
FM FLAG		J2-19 to J2-47: thru R10 and R11, 33.5 K ohms	
	FM SEL on	J2-19 to J1-20	Connect 28vdc. J2-47 to J2-48
	FM SEL on	J2-19 to J1-26	Connect 28vdc. J2-47 to J2-48
DAY-NIGHT LAMP TEST		J2-13 to J2-48	
		J2-14 to J2-48	(1) Connect 28vdc. J2-47 to J2-48 (2) Lamps in VOR SEL, DOP SEL, FM SEL and CMD SEL (3) Connect 5vac. J2-49 to J2-50
	MKR BCN O	Blue lamp lights	(1) Connect marker lamp voltage J2-27 to J2-48
	MKR BCN M	Amber lamp lights	
	MKR BCN I	White lamp lights	

CHAPTER 4
MAINTENANCE INSTRUCTIONS

4-1. General.

a. These procedures are prepared for performing Aviation intermediate Maintenance (AVIM) on avionics electronic equipment to determine the acceptability of repaired equipment. These procedures set forth specific requirements that a repaired electronic installation item must meet before it is returned to the using organization. The components covered in this chapter are the interphone junction box, gyro relay assembly, and the mode select panel.

b. The performance standards listed in the test procedures assume that all pertinent modification work orders have been performed. Check the current issue of DA PAM 3-10-4 to find the latest listing of modification work orders of the equipment under test.

c. No avim test procedures are included for the facilities listed in the following chart. The power-on inspection procedures in TM 11-1520-240-20 include all testing which can be performed by avim on installed facilities. Additional avim tests for these facilities consist of major component testing in a maintenance shop. These tests are covered in the technical manual listed.

EQUIPMENT	TECHNICAL MANUAL
Control Communication System C-6533/ARC	TM 11-5821-262-35
Radio Set AN/ARC-186	TM 11-5821-318-34
Radio Set AN/ARC-164	TM 11-5821-311-34
Radio Set AN/ARC-102	TM 11-5821-248-35
Direction Finder Set AN/ARN-89B	TM 11-5826-227-34
Radio Receiving Set AN/ARN-123	TM 11-5826-258-24
Doppler Navigation Set AS/ASN-128	TM 11-5841-281-12
Gyromagnetic Compass Set AN/ASN-43	TM 11-6605-202-35
Altimeter Set, Electronic AN/APN-209	TM 11-5841-292-13 & P
Transponder Set AN/APX-100	TM 11-5895-1037-12
Detecting Set Radar Signal AN/APR-39	TM 11-5841-283-34 (C)
Countermeasures Set AN/ALQ-156	DEPTM 11-5865-201-34

4-2. Tools and Test Equipment.

The test equipment and materials necessary for testing the electronic installation items are listed in the following chart. Equivalent test equipment may be used.

TEST EQUIPMENT AND MATERIALS	TECHNICAL MANUALS
Multimeter TS-352B/U	TM 11-6625-366-15

4-3. Test Procedures, Interphone Junction Box.

Testing of the interphone junction box is performed by continuity checks only. Using a multimeter, perform the continuity checks in table 3-1.

4-4. Disassembly, Interphone Junction Box (fig. 4-1).

Disassemble the interphone junction box in accordance with the following procedures:

a. Remove six screws securing the cover to the interphone junction box. Remove the cover.

b. Remove a receptacle as follow:

(1) Tag and disconnect the wires from the receptacle.

(2) Cut and remove lockwire from the jam nut.

(3) Remove the jam nut and remove the receptacle.

c. Remove a terminal board as follows:

(1) Tag and disconnect the wires from the terminal board modules.

(2) Remove two nuts, washers, and screws securing the terminal board to the interphone junction box.

(3) Remove the terminal board.

4-5. Cleaning, Interphone Junction Box.

WARNING

Cleaning compound trichlorotrifluoroethane can form toxic vapors if exposed to flame. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

a. Clean the cover and box with cleaning compound (trichlorotrifluoroethane).

b. Clean receptacles with aerosol freon.

4-6. Inspection, Interphone Junction Box.

a. Inspect receptacles for bent pins, damaged shells, or inserts. Replace as required.

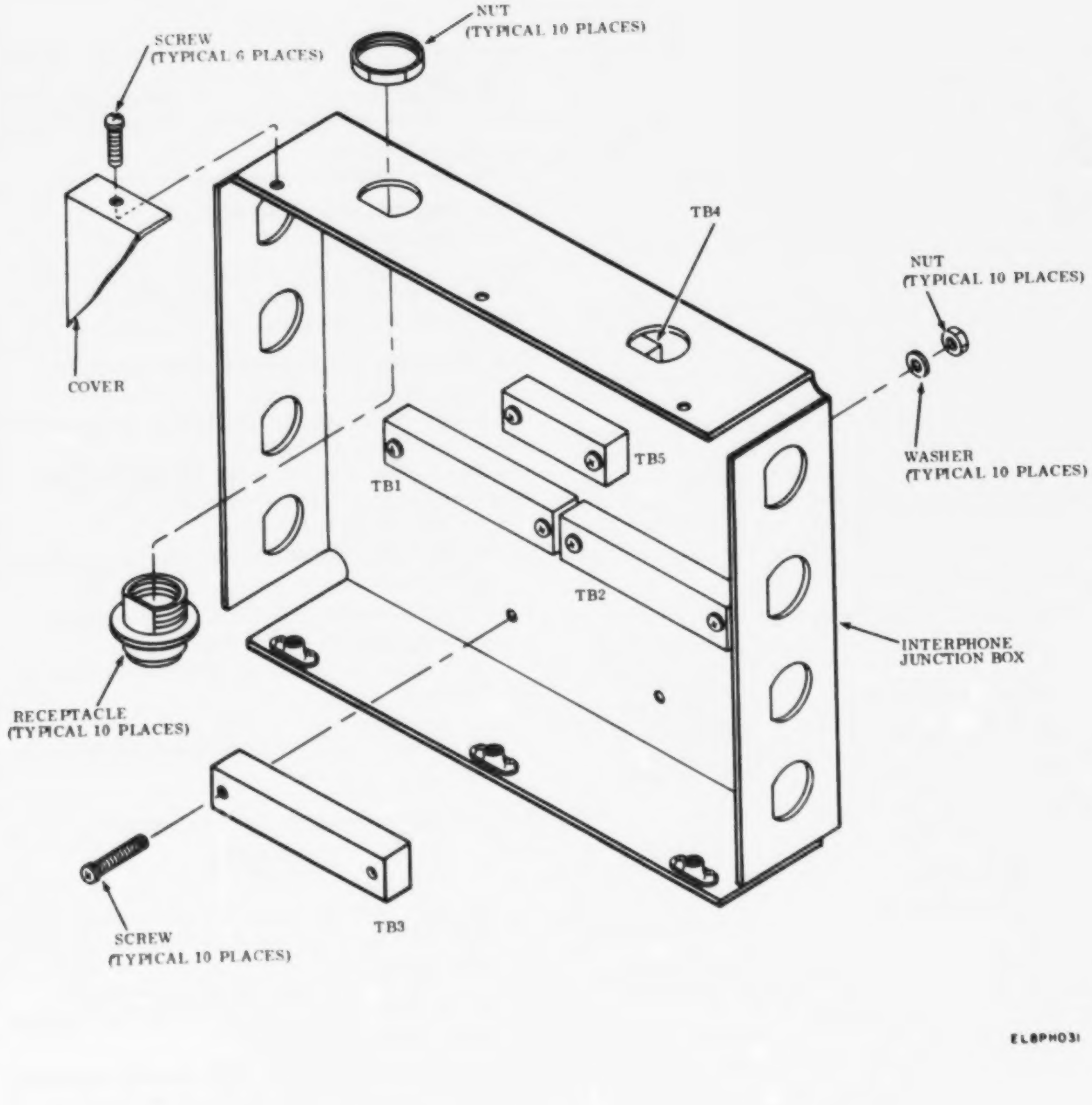

NUT
(TYPICAL 10 PLACES)
SCREW
(TYPICAL 6 PLACES)
TB4
NUT
(TYPICAL 10 PLACES)
COVER
WASHER
(TYPICAL 10 PLACES)
TB5
TB1
TB2
INTERPHONE
JUNCTION BOX
RECEPTACLE
(TYPICAL 10 PLACES)
SCREW
(TYPICAL 10 PLACES)
TB3
EL8PH031

Figure 4-1. Interphone junction box, exploded view

b. Inspect terminal board assemblies for damaged terminal board modules. Replace modules if wire termination pins do not seat properly.

c. Inspect platenuts for damage. Replace as required.

d. Inspect wire harness for broken wires. Replace as required.

4-7. Assembly, Interphone Junction Box (fig. 4-1).

a. Position the terminal boards and secure them to the junction box with two screws, washers, and nuts.

b. Connect the wires to the terminal board modules. See fig. FO-30.

c. Position the receptacles and secure them to the junction box with the jam nuts. Lockwire the jam nuts.

d. Connect the wires to the receptacles. See fig. FO-30.

e. Position the cover and secure it to the junction box with six screws.

f. Perform a test of the interphone junction box. Refer to para 4-3.

4-8. Test Procedures, Gyro Transfer Relay.

Testing of the gyro transfer relay is performed by continuity checks only. Using a multimeter, perform the continuity check in the charts in para 3-37.

4-9. Disassembly, Gyro Transfer Relay (fig. 4-2).

Disassemble the gyro transfer relay in accordance with the following procedures:

a. Remove relays M5757/1-103 as follows:

(1) Tag and disconnect the wires from the relay.

(2) Remove two screws and nuts that secure the relay to the bracket.

(3) Remove the relay.

b. Remove relays M39016/13-066L as follows:

(1) Tag and disconnect the wires from the relay.

(2) Remove two screws and nuts that secure the relay to the bracket.

(3) Remove the relay.

c. Remove the receptacles as follows:

(1) Tag and disconnect the wires from the receptacle.

(2) Cut and remove lockwire from the jam nut.

(3) Remove the jam nut and remove the receptacle.

4-10. Cleaning, Gyro Transfer Relay (fig. 4-2).

WARNING

Cleaning compound trichlorotrifluoroethane can form toxic vapors if exposed to flame. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

a. Clean the panel with cleaning compound trichlorotrifluoroethane.

b. Clean receptacles with aerosol freon.

4-11. Inspection, Gyro Transfer Relay.

a. Inspect receptacles for bent pins, damaged shells or inserts. Replace as required.

b. Inspect terminal board assemblies for damaged terminal board modules. Replace modules if wire termination pins do not seat properly.

c. Inspect wire harness for broken wires. Replace as required.

4-12. Assembly, Gyro Transfer Relay (fig. 4-2).

a. Install receptacles as follows:

(1) Position the receptacles and secure them with the jam nuts. Lockwire the jam nuts.

(2) Connect the wires into the receptacles. See fig. 3-1.

b. Install relays M5757/1-103 as follows:

(1) Position the relays and secure them with two screws and nuts.

(2) Connect the wires to the relays. See fig. 3-1.

c. Install relays M39016/13-066L as follows:

(1) Position the relays and secure them with two screws and nuts.

(2) Connect the wires to the relays. See fig. 3-1.

d. Perform a test of the gyro transfer relay. Refer to para 4-8.

4-13. Test Procedures, Hsi Mode Select Panel.

Testing of the hsi mode select panel is performed by continuity checks. Using a multimeter, perform the continuity checks in table 3-2.

4-14. Disassembly, Hsi Mode Select Panel (145E3134-1) (fig. 4-3).

Disassemble the hsi mode select panel in accordance with the following instructions:

NOTE

Some units may be potted. Carefully remove potting before removing components.

a. Remove four screws securing the cover to the mode select panel. Remove the cover.

b. Remove two screws and remove the light plate.

c. Remove two screws and washers from the front of the unit and two screws and washers from the rear. Remove the posts.

d. Remove four screws and the bracket for access to the relays.

e. Remove a relay as follows:

NOTE

Some units may have potting on the relay terminals. Carefully remove potting before removing the relay.

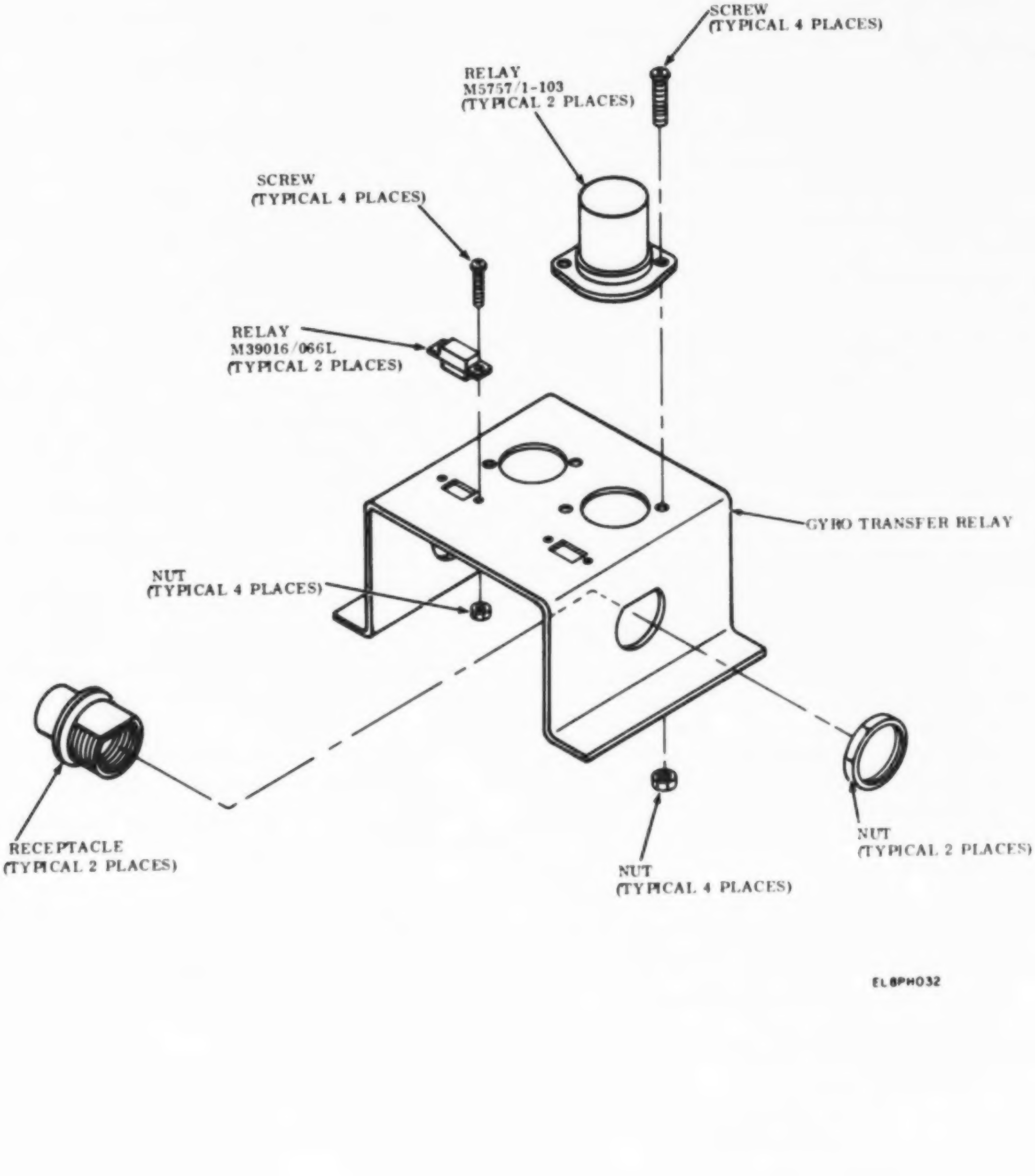

SCREW
(TYPICAL 4 PLACES)
RELAY
M5757/1-103
(TYPICAL 2 PLACES)
SCREW
(TYPICAL 4 PLACES)
RELAY
M39016/066L
(TYPICAL 2 PLACES)
GYRO TRANSFER RELAY
NUT
(TYPICAL 4 PLACES)
RECEPTACLE
(TYPICAL 2 PLACES)
NUT
(TYPICAL 4 PLACES)
NUT
(TYPICAL 2 PLACES)
EL8PH032

Figure 4-2. Gyro transfer relay, exploded view

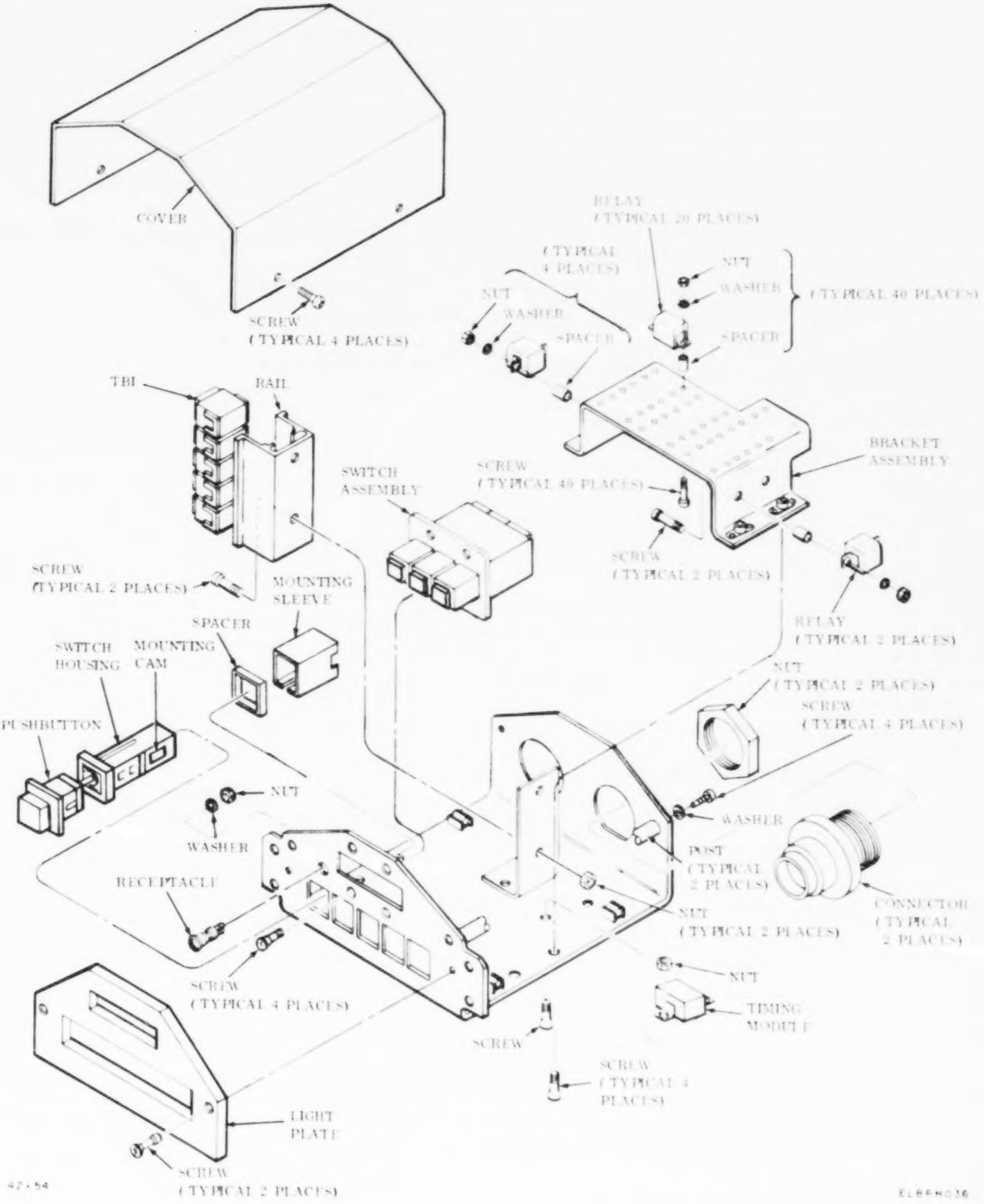

COVER
SCREW
(TYPICAL 4 PLACES)
RELAY
(TYPICAL 20 PLACES)
(TYPICAL
4 PLACES)
NUT
WASHER
SPACER
NUT
WASHER
SPACER
(TYPICAL 40 PLACES)
TBI
RAIL
SWITCH
ASSEMBLY
SCREW
(TYPICAL 40 PLACES)
BRACKET
ASSEMBLY
SCREW
(TYPICAL 2 PLACES)
SCREW
(TYPICAL 2 PLACES)
MOUNTING
SLEEVE
RELAY
(TYPICAL 2 PLACES)
SPACER
SWITCH
HOUSING
MOUNTING
CAM
PUSHBUTTON
NUT
(TYPICAL 2 PLACES)
SCREW
(TYPICAL 4 PLACES)
NUT
WASHER
WASHER
POST
(TYPICAL
2 PLACES)
RECEPTACLE
NUT
(TYPICAL 2 PLACES)
CONNECTOR
(TYPICAL
2 PLACES)
SCREW
(TYPICAL 4 PLACES)
NUT
TIMING
MODULE
SCREW
SCREW
(TYPICAL 4
PLACES)
LIGHT
PLATE
SCREW
(TYPICAL 2 PLACES)
42-54
ELBPH036

Figure 4-3. Hsi mode select panel exploded view (145E3134-1)

(1) Tag and disconnect the wires from the relay.

(2) Remove two nuts, washers, spacers, and screws securing the relay to the bracket.

(3) Remove the relay.

f. Remove TB1 as follows:

(1) Tag and disconnect the wires from the terminal board modules.

(2) Remove five terminal modules from the rail.

(3) Remove two screws and nuts and remove the rail.

g. Remove timing module as follows:

(1) Tag and disconnect the wires from the timing module.

(2) Remove two screws and nuts and remove the timing module.

h. Tag and disconnect the wires from the receptacle.

i. Remove one nut and washer and remove the receptacle with the ground lug.

j. Remove the marker beacon switch assembly as follows:

(1) Tag and disconnect the wires from the switch assembly.

(2) Remove four screws and remove the switch assembly.

k. Remove a pushbutton switch as follows:

(1) Tag and disconnect wires from the switch.

(2) Using a screwdriver, remove the pushbutton lens from the front of the switch.

(3) Using a screwdriver, turn the locking screws, inside the switch housing, counterclockwise until the mounting cams are in the unlocked position.

(4) Slide the mounting sleeve and spacer from the switch housing.

(5) Pull the switch housing out thru the front of the panel.

l. Remove the receptacles (J1 & J2) as follows:

(1) Tag and disconnect the wires from the receptacle.

(2) Cut and remove the lockwire from the jam nut.

(3) Remove the jam nut and remove the receptacle.

4-14.1. Disassembly, HSI Mode Select Panel. (145E3134-2 and -4) (fig. 4-4).

Disassemble the hsi mode select panel in accordance with the following instructions:

a. Remove four screws from the rear of the panel securing the cover to the panel. Remove the cover and gaskets.

b. Remove two screws and remove the light plate.

c. Remove seven screws securing printed circuit board A1 to the top of the panel. Carefully remove the printed circuit board.

d. Remove printed circuit board and connector assembly as follows:

(1) Tag and disconnect five wires from printed circuit board A2.

(2) Remove three screws securing printed circuit board A2 to the frame.

(3) Remove four remaining screws securing the connectors to the frame. Remove the printed circuit board and connector assembly from the frame.

e. Remove printed circuit board A3 as follows:

(1) Remove two screws from the center of each side of the frame securing printed circuit board A3.

(2) Tag and disconnect three wires from the printed circuit board. Remove the printed circuit board.

f. Remove switch support as follows:

(1) Remove two screws from the center of each side of the frame.

(2) Slide the switch support over the rear of the switches and remove the support.

g. Remove four screws securing the frame to the front plate. Remove the frame.

h. Remove the marker beacon switch assembly as follows:

(1) Tag and disconnect the wires from the switch assembly.

(2) Remove four screws securing the switch assembly to the front plate. Remove the switch assembly.

i. Remove a pushbutton switch as follows:

(1) Using a screwdriver, remove the pushbutton lens from the front of the switch.

(2) Using a screwdriver, turn the locking screw, inside the switch housing, counterclockwise until the mounting cams are in the unlocked position.

(3) Slide the mounting sleeve from the switch housing.

(4) Pull the switch housing out thru the front of the front plate.

j. Tag and disconnect the wires from the light receptacle on the front plate.

k. Remove one nut and washer and remove the receptacle with the ground lug.

4-15. Cleaning, Mode Select Panel (fig. 4-3).

WARNING

Cleaning compound trichlorotrifluoroethane can form toxic vapors if exposed to flame. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

a. Clean cover, bracket assembly, and housing with cleaning compound (trichlorotrifluoroethane).

b. Clean receptacles with aerosol freon.

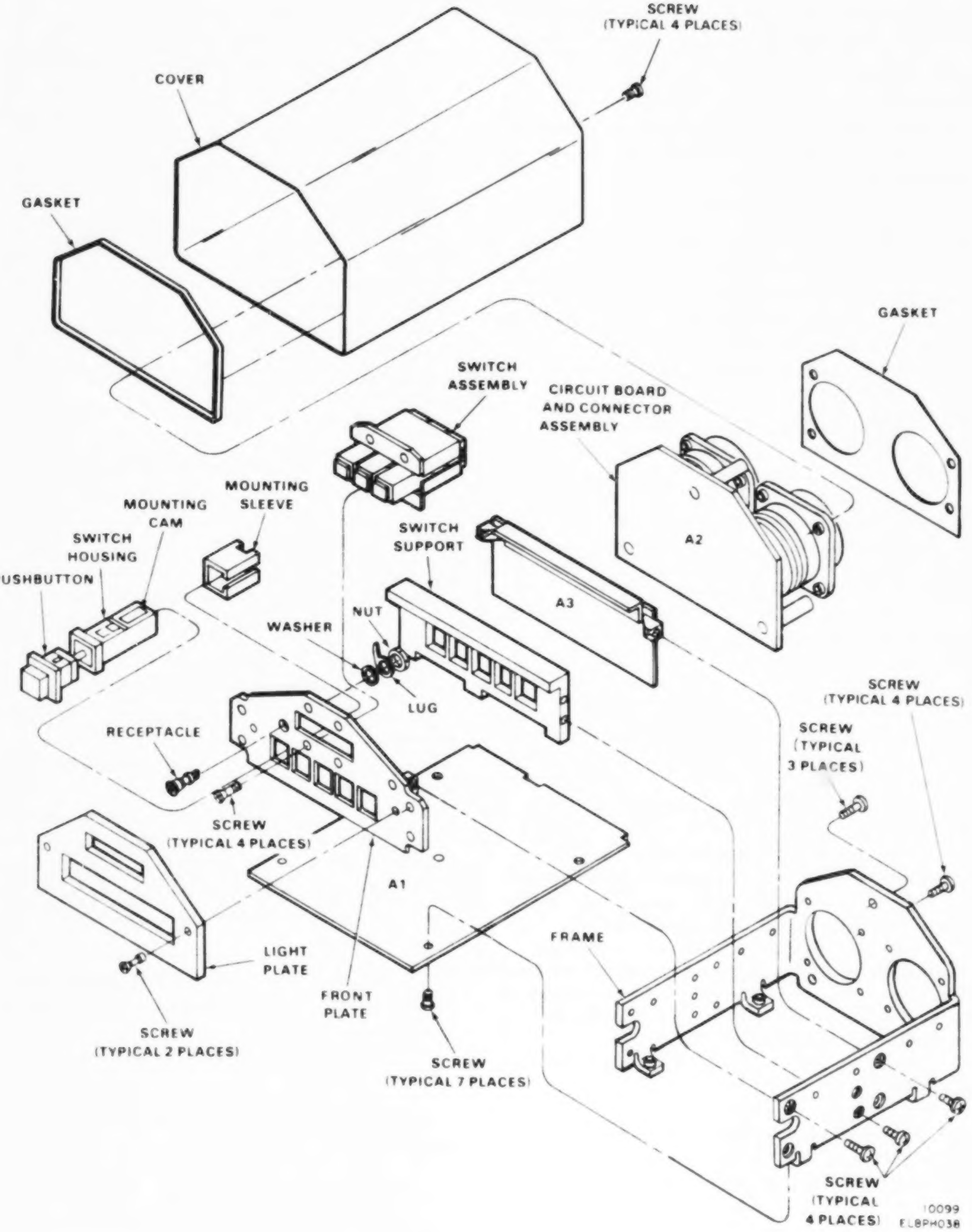

SCREW
(TYPICAL 4 PLACES)
COVER
GASKET
GASKET
SWITCH
ASSEMBLY
CIRCUIT BOARD
AND CONNECTOR
ASSEMBLY
MOUNTING
SLEEVE
MOUNTING
CAM
SWITCH
HOUSING
PUSHBUTTON
SWITCH
SUPPORT
A2
A3
NUT
WASHER
LUG
RECEPTACLE
SCREW
(TYPICAL 4 PLACES)
SCREW
(TYPICAL
3 PLACES)
SCREW
(TYPICAL 4 PLACES)
A1
LIGHT
PLATE
FRONT
PLATE
FRAME
SCREW
(TYPICAL 2 PLACES)
SCREW
(TYPICAL 7 PLACES)
SCREW
(TYPICAL
4 PLACES)
10099
EL8PH038

Figure 4-4. Hsi mode select panel exploded view (145E3134-2 and -4)

4-16. Inspection, Mode Select Panel.

a. Inspect receptacles for bent pins, damaged shells or inserts. Replace as required.

b. Inspect terminal boards for damaged modules. Replace modules if wire termination pins do not seat properly.

c. Inspect platenuts for damage. Replace as required.

d. Inspect wire harness for broken wires. Repair or replace as required.

4-17. Assembly, Mode Select Panel (145E3134-1) (fig. 4-3).

a. Install receptacles as follows:

(1) Position the receptacles and secure them with the jam nuts. Lockwire the jam nuts.

(2) Connect the wires to the receptacles. See fig. FO-31.

b. Install a pushbutton switch as follows:

(1) Position the switch housing and pushbutton thru the front of the panel with the word TOP up.

(2) Slide the spacer and mounting sleeve over the back of the switch housing, up against the panel.

(3) Turn locking screws, inside switch housing, clockwise to bring mounting cams to the locked position. Torque screws 1.0 to 1.5 inch pounds.

(4) Push the pushbutton into the housing with the word TOP on the pushbutton matching the word TOP on the switch housing.

(5) Connect the wires to the switch. See fig. FO-31.

c. Install marker beacon switch assembly as follows:

(1) Position the switch assembly and secure it with four screws.

(2) Connect the wires to the switch assembly. See fig. FO-31.

(3) Insulate switch terminals of the switch assembly, using Dow Corning DC3145 (clear) sealant as follows:

(a) Prime all areas to be coated with DC1204 primer. Air dry for a minimum of 60 minutes.

(b) Apply sealant DC3145 (clear) to produce a cured coating thickness of approximately 0.040 to 0.060 inch. The coating shall cover all conductive surfaces of switch terminals and as much of the adjacent areas as necessary to provide insulation.

(c) Allow sealant DC3145 to cure for a minimum of 24 hours.

d. Position the light receptacle on the front panel and secure it with a nut and washer.

e. Connect the wires to the light receptacle. See fig. FO-31.

f. Position the timing module and secure it with two screws and nuts.

g. Connect the wires to the timing module. See fig. FO-31.

h. Install TB1 as follows:

(1) Position the module rail and secure it to the bracket with two screws and nuts.

(2) Install five modules into the rail.

(3) Connect the wires to the modules. See fig. FO-31.

i. Install relays as follows:

(1) Position the relay and secure it to the bracket with two screws, washers, spacers, and nuts.

(2) Connect the wires to the relay. See fig. FO-31.

j. Position the bracket and secure it to the panel with four screws.

k. Position two posts and secure them to the panel with four screws and washers.

l. Position the light plate and secure it to the front of the panel with two screws.

m. Install the cover and secure it to the panel with four screws.

n. Perform a test of the hsi mode select panel. Refer to para 4-13.

4-18. Assembly, Mode Select Panel (145E3134-2 and -4) (fig. 4-4).

a. Install the light receptacle as follows:

(1) Position the light receptacle on the front plate and secure it with a ground lug, washer, and nut.

(2) Connect the wires to the light receptacle. See fig. 4-5 and fig. FO-31.

b. Install a pushbutton switch as follows:

(1) Position the switch housing and pushbutton thru the front of the front plate with the word TOP up.

(2) Slide the mounting sleeve over the back of the switch housing, up against the front plate.

(3) Turn locking screws, inside switch housing, clockwise to bring mounting cams to the locked position. Torque screws 1.0 to 1.5 inch-pounds.

(4) Push the pushbutton into the housing with the word TOP on the pushbutton matching the word TOP on the switch housing.

c. Install marker beacon switch assembly as follows:

(1) Position the switch assembly in the front plate and secure it with four screws.

(2) Connect the wires to the switch assembly. See fig. 4-5 and fig. FO-31.

d. Position the frame on the front plate and secure it with four screws.

e. Install the switch support as follows:

(1) Slide the switch support over the rear of the pushbutton switches.

(2) Position the support and secure it with two screws on each side of the frame.

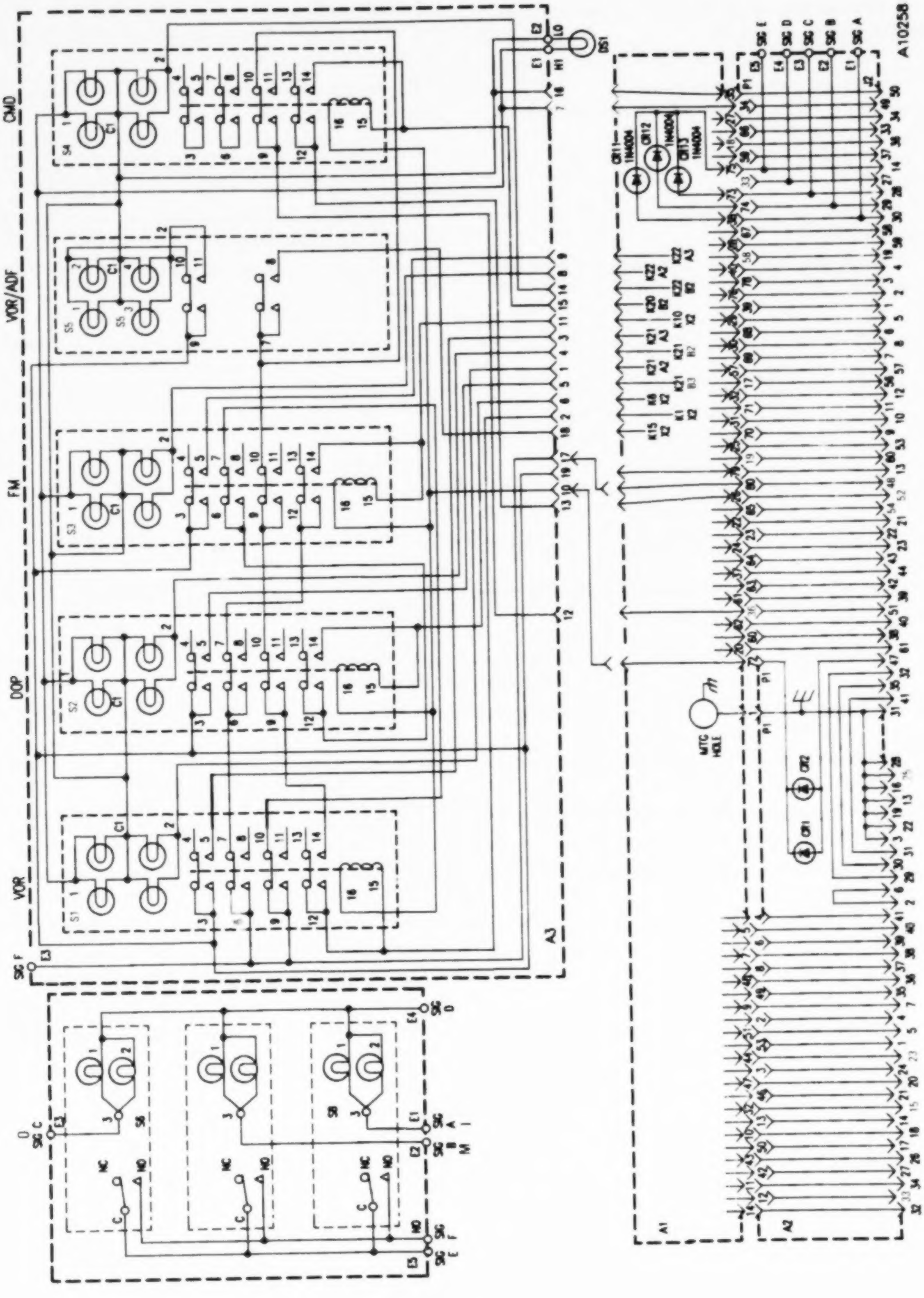

CMD
VOR/ADF
FM
DOP
VOR
S1
S2
S3
S4
S5
S6
C1
NC
NO
C
A1
A2
A3
DS1
HI
LO
MTC HOLE
CR1
CR2
CR11
CR12
CR13
1N4004
P1
J2
E1
E2
E3
E4
E5
SIG A
SIG B
SIG C
SIG D
SIG E
SIG F
A10258

Figure 4-5. *Hsi mode select panel interconnecting diagram (145E3134-2)*

f. Install printed circuit board A3 as follows:

(1) Position printed circuit board A3 and make connections to switches S1 thru S5.

(2) Install two screws on the center of each side of the frame securing the printed circuit board.

(3) Connect three wires to printed circuit board A3. See fig. 4-5 and fig. FO-31.

g. Install printed circuit board A2, and connector as follows:

(1) Position the printed circuit board and connector assembly into the frame.

(2) Secure the printed circuit board and connector assembly with three screws on the standoffs of the printed circuit board and two screws on the inboard side of each connector.

(3) Connect five wires to printed circuit board A2. See fig. 4-5 and fig. FO-31.

h. Position printed circuit board A1 and connect it to printed circuit board A2 and A3.

i. Secure printed circuit board A1 with seven screws.

j. Position the light plate and secure it to the front of the panel with two screws.

k. Position the gasket and cover and secure with four screws on the rear of the panel.

l. Perfor n a test of the hsi mode select panel. Refer to para. 4-13.

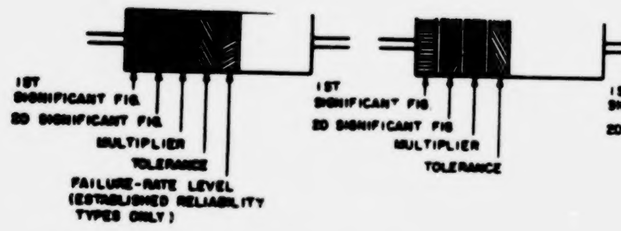
APPENDIX A
REFERENCES

Following is a list of references applicable and available to the aviation intermediate maintenance repairman.

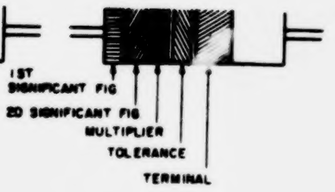
DA PAM 310-1	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, 9), Supply Bulletins and Lubrication Orders
TM 11-1520-240-20	Aviation Unit Maintenance Manual: Electronic Equipment Configuration, Army Model CH-47D Helicopter
TM 11-5821-248-35	DS, GS, and Depot Maintenance Manual: Radio Set AN/ARC-102
TM 11-5821-262-35	Control Communication System C-6533/ARC
TM 11-5821-311-34	Direct Support and General Support Maintenance Manual: Receiver-Transmitter, Radio RT-1167/ARC-164
TM 11-5821-318-12	Operator's and Aviation Unit Maintenance Manual: Receiver-Transmitter RT-1354/ARC-186
TM 11-5826-227-34	Direct Support and General Support Maintenance Manual: Direction Finder Set AN/ARN-89
TM 11-5826-258-24	Organizational, Direct Support, and General Support Maintenance Manual: Radio Receiving Sets AN/ARN-123(V)1 and AN/ARN-123(V)2
TM 11-5841-281-12	Operator's and Organizational Maintenance Manual: Doppler Navigation Set AN/ASN-128
TM 11-5841-283-34(C)	Direct Support and General Support Maintenance Manual: Detecting Set, Radar Signal AN/APR-39
TM 11-5841-292-13 & P	Operator's, Aviation Unit, Aviation Intermediate Maintenance Manual (Including Repair Parts and Special Tools List) for Altimeter Set, Electronic AN/APN-209A(V)1, AN/APN-209A(V)2, and AN/APN-209A(V)3
DEPTM 11-5865-201-34-1	Direct Support and General Support Maintenance Manual for Countermeasures Set AN/ALQ-156
TM 11-5895-1037-12	Operator's and Organizational Maintenance Manual: Transponder Set AN/APX-100
TM 11-6605-202-35	DS, GS, and Depot Maintenance Manual: Gyromagnetic Compass Set AN/ASN-43
TM 11-6625-667-12	Organizational Maintenance Manual: Test Set, Transponder AN/APM-123(V)1
TM 11-6940-211-12	Operator's and Organizational Maintenance Manual: Simulator, Radar Signal SM-674/UPM
TM 38-750	The Army Maintenance Management System (TAMMS)
TM 55-1500-323-25	Organizational, DS, GS, and Depot Maintenance Manual: Installation Practices for Aircraft and Electric and Electronic Wiring
TM 55-1520-240-10	Operator's Manual: Army Model CH-47D Helicopter
TM 55-1520-240-23	Aviation Unit Maintenance Manual: Army Model CH-47D Helicopter

Charts Transposed to

End of Volume.


1ST SIGNIFICANT FIG
2D SIGNIFICANT FIG
MULTIPLIER
TOLERANCE
FAILURE-RATE LEVEL (ESTABLISHED RELIABILITY TYPES ONLY)
1ST SIGNIFICANT FIG
2D SIGNIFICANT FIG
MULTIPLIER
TOLERANCE

COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.


1ST SIGNIFICANT FIG
2D SIGNIFICANT FIG
MULTIPLIER
TOLERANCE
TERMINAL

COLOR-CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I
COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E		
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL	TERM
BLACK	0	BLACK	0	BLACK	1			BROWN	M=1.0	
BROWN	1	BROWN	1	BROWN	10			RED	P=0.1	
RED	2	RED	2	RED	100			ORANGE	R=0.01	
ORANGE	3	ORANGE	3	ORANGE	1,000			YELLOW	S=0.001	
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	±10 (COMP. TYPE ONLY)	WHITE		SOLDERABLE
GREEN	5	GREEN	5	GREEN	100,000	GOLD	±5			
BLUE	6	BLUE	6	BLUE	1,000,000	RED	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY).			
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7							
GRAY	8	GRAY	8	SILVER	0.01					
WHITE	9	WHITE	9	GOLD	0.1					

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH.)

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE-RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS) ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1-1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

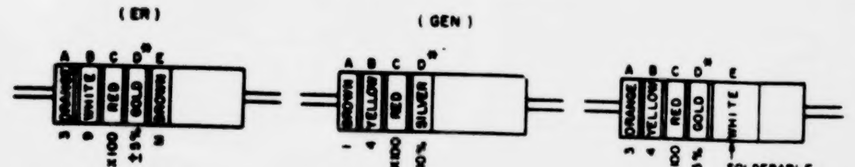
RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS
(THESE ARE NOT COLOR CODED)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS 10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED, IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

EXAMPLES OF COLOR CODING


(ER)
A B C D* E
ORANGE
WHITE
RED
GOLD
BROWN
3
9
X100
±5%
M
(GEN)
A B C D*
BROWN
YELLOW
RED
SILVER
1
4
X100
±10%
A B C D* E
ORANGE
YELLOW
RED
GOLD
WHITE
3
4
X100
±5%
SOLDERABLE

NOMINAL RESISTANCE 3,900 OHMS
RESISTANCE TOLERANCE ±5%
FAILURE RATE LEVEL M

NOMINAL RESISTANCE 1,400 OHMS
RESISTANCE TOLERANCE ±10%

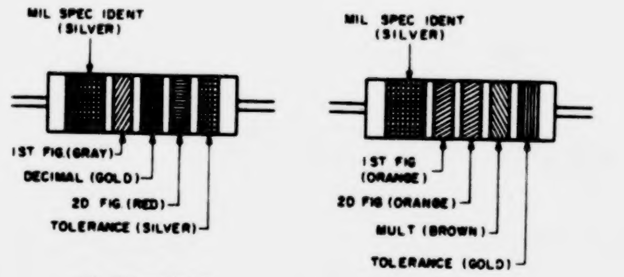
NOMINAL RESISTANCE 3,400 OHMS
RESISTANCE TOLERANCE ±5%
TERMINAL SOLDERABLE

COMPOSITION-TYPE RESISTORS

FILM-TYPE RESISTORS

* IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS


MIL SPEC IDENT (SILVER)
1ST FIG (GRAY)
DECIMAL (GOLD)
2D FIG (RED)
TOLERANCE (SILVER)
MIL SPEC IDENT (SILVER)
1ST FIG (ORANGE)
2D FIG (ORANGE)
MULT (BROWN)
TOLERANCE (GOLD)

(A) 8.2UH ± 10%

(B) 330UH ± 5%

COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF OF THE CODING FOR AN 8.2UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330 UH INDUCTOR ARE ILLUSTRATED.

TABLE 2
COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES

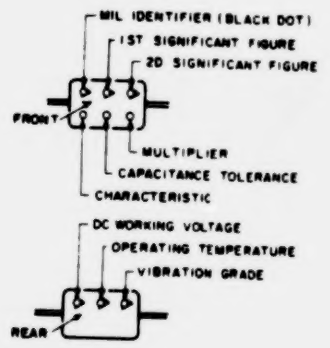
COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS

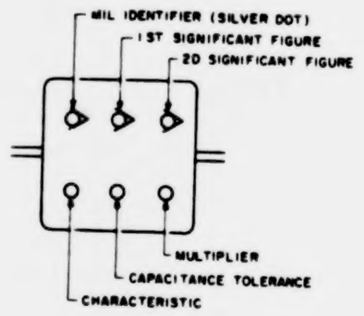
CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB

CM


MIL IDENTIFIER (BLACK DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
FRONT
MULTIPLIER
CAPACITANCE TOLERANCE
CHARACTERISTIC
DC WORKING VOLTAGE
OPERATING TEMPERATURE
VIBRATION GRADE
REAR

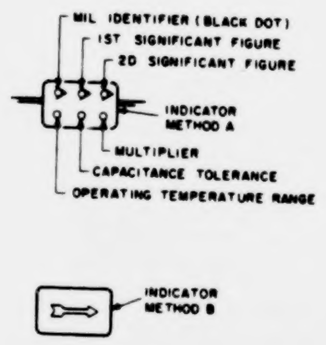
MICA-DIELECTRIC

CN


MIL IDENTIFIER (SILVER DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
CHARACTERISTIC

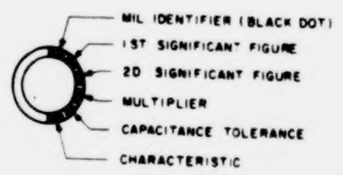
PAPER-DIELECTRIC

CY


MIL IDENTIFIER (BLACK DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
INDICATOR METHOD A
MULTIPLIER
CAPACITANCE TOLERANCE
OPERATING TEMPERATURE RANGE
INDICATOR METHOD B

GLASS-DIELECTRIC, GLASS CASE

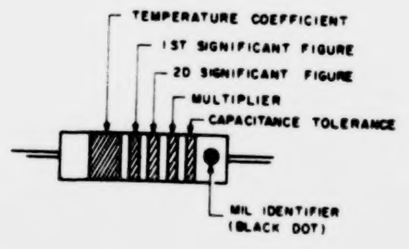
CB


MIL IDENTIFIER (BLACK DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
CHARACTERISTIC

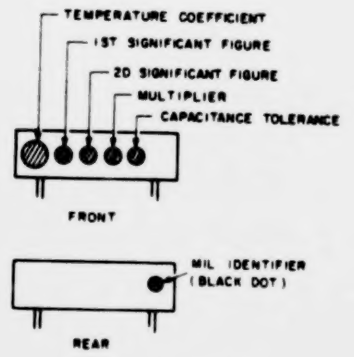
MICA, BUTTON TYPE

TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB

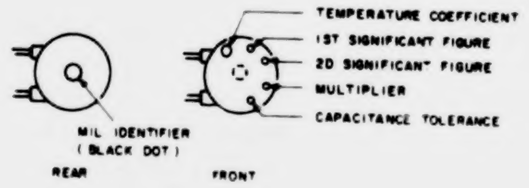
COLOR	MIL ID	1ST SIG FIG	2D SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]			DC WORKING VOLTAGE	OPERATING TEMP RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A			-55° TO +70°C	10-55 HZ
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	C				-55° TO +85°C	
ORANGE		3	3	1,000		±30%			D		D	300		
YELLOW		4	4	10,000					E				-55° TO +125°C	10-2,000 HZ
GREEN		5	5		±5%				F			500		
BLUE		6	6										-55° TO +150°C	
PURPLE (VIOLET)		7	7											
GREY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN				±10%	±10%	±10%	±10%						


TEMPERATURE COEFFICIENT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
MIL IDENTIFIER (BLACK DOT)

AXIAL LEAD


TEMPERATURE COEFFICIENT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
FRONT
MIL IDENTIFIER (BLACK DOT)
REAR

RADIAL LEAD


TEMPERATURE COEFFICIENT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
MIL IDENTIFIER (BLACK DOT)
REAR
FRONT

DISK-TYPE

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC

COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG	2D SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		±2.0 UUF	CC
BROWN	-30	1	1	10	±1%		
RED	-80	2	2	100	±2%	±0.25 UUF	
ORANGE	-150	3	3	1,000			
YELLOW	-220	4	4				
GREEN	-330	5	5		±5%	±0.5 UUF	
BLUE	-470	6	6				
PURPLE (VIOLET)	-750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	±10%		
GOLD	+100					±1.0 UUF	
SILVER							

[1] THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.

[2] LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS MIL-C-5, MIL-C-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.

[3] LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.

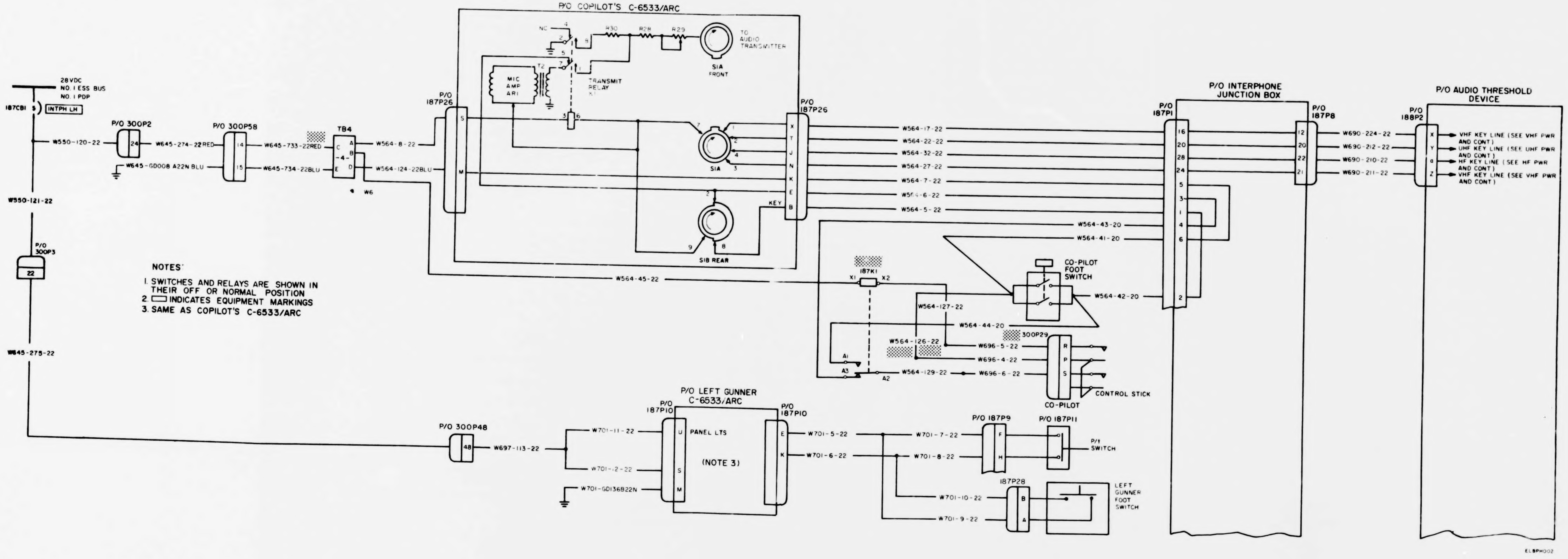
[4] TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

C. COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

ESC-FM 1794-71

Figure FO-1. MIL-STD resistor, inductor, and capacitor color-code markings

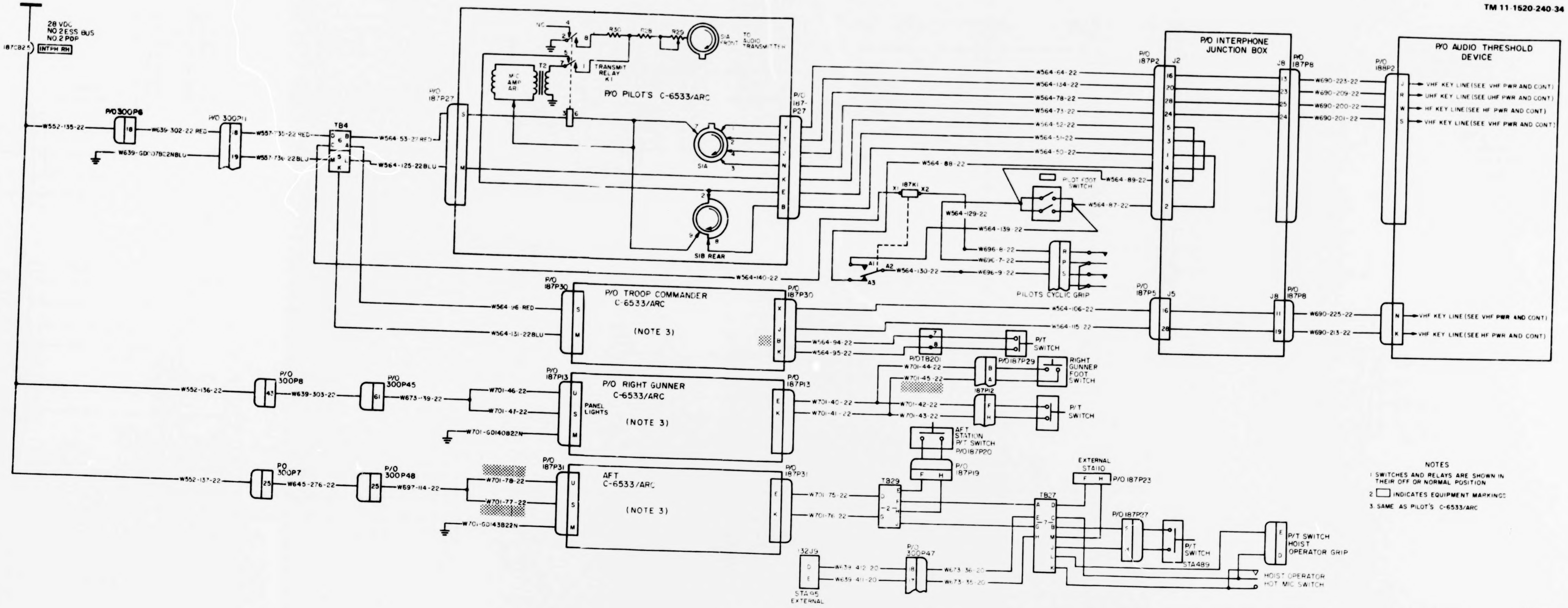
best copy available


28 VDC
NO. 1 ESS BUS
NO. 1 PDP
187CB1
5
INTPH LH
W550-120-22
W550-121-22
P/O 300P3
22
W645-275-22
P/O 300P2
24
W645-274-22 RED
W645-GD008 A22N BLU
P/O 300P58
14
15
W645-733-22RED
W645-734-22BLU
TB4
A
B
C
-4-
D
E
W6
W564-8-22
W564-124-22BLU
P/O 187P26
S
M
P/O COPILOT'S C-6533/ARC
NC
4
2
5
7
8
1
R30
R28
R29
TO AUDIO TRANSMITTER
S1A FRONT
MIC AMP AR1
T2
TRANSMIT RELAY K1
3
6
S1A
S1B REAR
9
KEY
P/O 187P26
X
T
J
N
K
E
B
W564-17-22
W564-22-22
W564-32-22
W564-27-22
W564-7-22
W564-6-22
W564-5-22
W564-43-20
W564-41-20
W564-42-20
W564-45-22
187K1
X1
X2
W564-127-22
W564-44-20
W564-126-22
W564-129-22
A1
A2
A3
CO-PILOT FOOT SWITCH
300P29
W696-5-22
W696-4-22
W696-6-22
R
P
S
CONTROL STICK
CO-PILOT
P/O INTERPHONE JUNCTION BOX
P/O 187P1
16
20
28
24
5
3
1
4
6
2
P/O 187P8
12
20
22
21
W690-224-22
W690-212-22
W690-210-22
W690-211-22
P/O AUDIO THRESHOLD DEVICE
P/O 188P2
X
Y
a
Z
VHF KEY LINE (SEE VHF PWR AND CONT)
UHF KEY LINE (SEE UHF PWR AND CONT)
HF KEY LINE (SEE HF PWR AND CONT)
VHF KEY LINE (SEE VHF PWR AND CONT)
P/O 300P48
48
W697-113-22
W701-11-22
W701-12-22
W701-GD136B22N
P/O LEFT GUNNER C-6533/ARC
P/O 187P10
U
S
M
PANEL LTS
(NOTE 3)
P/O 187P10
E
K
W701-5-22
W701-6-22
W701-7-22
W701-8-22
P/O 187P9
F
H
P/O 187P11
P/t SWITCH
187P28
B
A
W701-10-22
W701-9-22
LEFT GUNNER FOOT SWITCH
EL5PH002

NOTES:

1. SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
2. ▭ INDICATES EQUIPMENT MARKINGS
3. SAME AS COPILOT'S C-6533/ARC

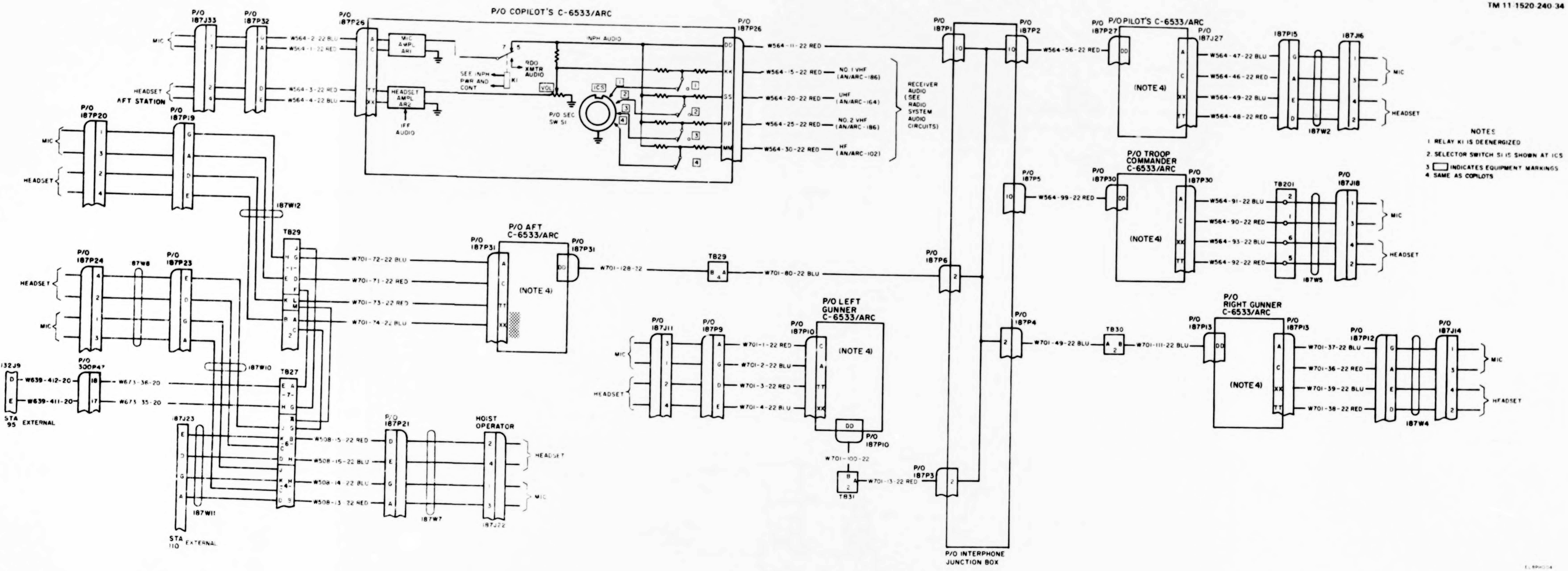
Figure FO-2 Interphone facility power and control circuits (Sheet 1 of 2)


28 VDC
NO 2 ESS BUS
NO 2 PDP
187CB25
INTPH RH
P/O 300P6
W552-135-22
W639-302-22 RED
W639-GD107B22NBLU
P/O 300P11
W557-735-22 RED
W557-736-22BLU
TB4
W564-53-22 RED
W564-125-22BLU
P/O 187P27
P/O PILOT'S C-6533/ARC
NC
R30
R28
R29
S1A FRONT
TO AUDIO TRANSMITTER
TRANSMIT RELAY K1
MIC AMP AR1
T2
S1A
S1B REAR
P/O 187-P27
W564-64-22
W564-134-22
W564-78-22
W564-73-22
W564-52-22
W564-51-22
W564-50-22
W564-88-22
W564-89-22
W564-87-22
PILOT FOOT SWITCH
187K1
X1
X2
W564-129-22
W564-139-22
W696-8-22
W696-7-22
W696-9-22
W564-130-22
A1
A2
A3
PILOTS CYCLIC GRIP
W564-140-22
P/O INTERPHONE JUNCTION BOX
P/O 187P2
J2
J8
P/O 187P8
P/O 187P5
J5
W690-223-22
W690-209-22
W690-200-22
W690-201-22
W690-225-22
W690-213-22
P/O AUDIO THRESHOLD DEVICE
P/O 188P2
VHF KEY LINE (SEE VHF PWR AND CONT)
UHF KEY LINE (SEE UHF PWR AND CONT)
HF KEY LINE (SEE HF PWR AND CONT)
VHF KEY LINE (SEE VHF PWR AND CONT)
VHF KEY LINE (SEE VHF PWR AND CONT)
VHF KEY LINE (SEE HF PWR AND CONT)
P/O 187P30
P/O TROOP COMMANDER C-6533/ARC
(NOTE 3)
W564-96 RED
W564-131-22BLU
W564-106-22
W564-115-22
W564-94-22
W564-95-22
P/O TB201
P/T SWITCH
W552-136-22
P/O 300P8
W639-303-22
P/O 300P45
W673-139-22
W701-46-22
W701-47-22
W701-GD140B22N
PANEL LIGHTS
P/O 187P13
P/O RIGHT GUNNER C-6533/ARC
(NOTE 3)
W701-40-22
W701-41-22
W701-44-22
W701-45-22
W701-42-22
W701-43-22
P/O 187P29
RIGHT GUNNER FOOT SWITCH
187P12
P/T SWITCH
AFT STATION P/T SWITCH
P/O 187P20
P/O 187P19
W552-137-22
P0 300P7
W645-276-22
P/O 300P48
W697-114-22
W701-78-22
W701-77-22
W701-GD143B22N
P/O 187P31
AFT C-6533/ARC
(NOTE 3)
W701-75-22
W701-76-22
TB29
TB27
EXTERNAL STA110
P/O 187P23
P/O 187P27
P/T SWITCH
STA489
P/T SWITCH HOIST OPERATOR GRIP
HOIST OPERATOR HOT MIC SWITCH
132J9
STA 95 EXTERNAL
W639-412-20
W639-411-20
P/O 300P47
W673-36-20
W673-35-20

NOTES

1. SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
2. ▭ INDICATES EQUIPMENT MARKINGS
3. SAME AS PILOT'S C-6533/ARC

Figure FO-2. Interphone facility power and control circuits (Sheet 2 of 2)


P/O COPILOT'S C-6533/ARC
P/O 187J33
P/O 187P32
P/O 187P26
MIC
HEADSET
AFT STATION
W564-2-22 BLU
W564-1-22 RED
W564-3-22 RED
W564-4-22 BLU
MIC AMPL AR1
HEADSET AMPL AR2
IFF AUDIO
SEE INPH PWR AND CONT
K1
RDO XMTR AUDIO
INPH AUDIO
VOL
P/O SEC SW S1
ICS
W564-11-22 RED
W564-15-22 RED
W564-20-22 RED
W564-25-22 RED
W564-30-22 RED
NO. 1 VHF (AN/ARC-186)
UHF (AN/ARC-164)
NO. 2 VHF (AN/ARC-186)
HF (AN/ARC-102)
RECEIVER AUDIO (SEE RADIO SYSTEM AUDIO CIRCUITS)
P/O 187P1
P/O 187P2
P/O 187P3
P/O 187P4
P/O 187P5
P/O 187P6
P/O INTERPHONE JUNCTION BOX
W564-56-22 RED
P/O 187P27
P/O PILOT'S C-6533/ARC
P/O 187J27
(NOTE 4)
W564-47-22 BLU
W564-46-22 RED
W564-49-22 BLU
W564-48-22 RED
187P15
187J16
187W2
MIC
HEADSET
W564-99-22 RED
P/O TROOP COMMANDER C-6533/ARC
P/O 187P30
TB201
P/O 187J18
W564-91-22 BLU
W564-90-22 RED
W564-93-22 BLU
W564-92-22 RED
187W5
P/O 187P20
P/O 187P19
187W12
P/O 187P24
87W8
P/O 187P23
TB29
P/O AFT C-6533/ARC
P/O 187P31
W701-72-22 BLU
W701-71-22 RED
W701-73-22 RED
W701-74-22 BLU
W701-128-22
TB29
W701-80-22 BLU
132J9
P/O 300P47
W639-412-20
W639-411-20
W673-36-20
W673-35-20
STA 95 EXTERNAL
187W10
TB27
187J23
187W11
STA 110 EXTERNAL
W508-15-22 RED
W508-15-22 BLU
W508-14-22 BLU
W508-13-22 RED
P/O 187P21
187W7
HOIST OPERATOR
187J22
P/O 187J11
P/O 187P9
P/O LEFT GUNNER C-6533/ARC
P/O 187P10
W701-1-22 RED
W701-2-22 BLU
W701-3-22 RED
W701-4-22 BLU
W701-100-22
TB31
W701-13-22 RED
W701-49-22 BLU
TB30
W701-111-22 BLU
P/O RIGHT GUNNER C-6533/ARC
P/O 187P13
W701-37-22 BLU
W701-36-22 RED
W701-39-22 BLU
W701-38-22 RED
P/O 187P12
P/O 187J14
187W4
EL8PH004

NOTES

1. RELAY K1 IS DEENERGIZED
2. SELECTOR SWITCH S1 IS SHOWN AT ICS
3. ☐ INDICATES EQUIPMENT MARKINGS
4. SAME AS COPILOTS

Figure FO-3. Interphone facility audio circuits

NOTES:

1 SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION

2 ▭ INDICATES EQUIPMENT MARKINGS

3 SEE INTERPHONE POWER AND CONTROL CIRCUITS FOR CONTINUATION OF KEYING CONTROL CIRCUIT

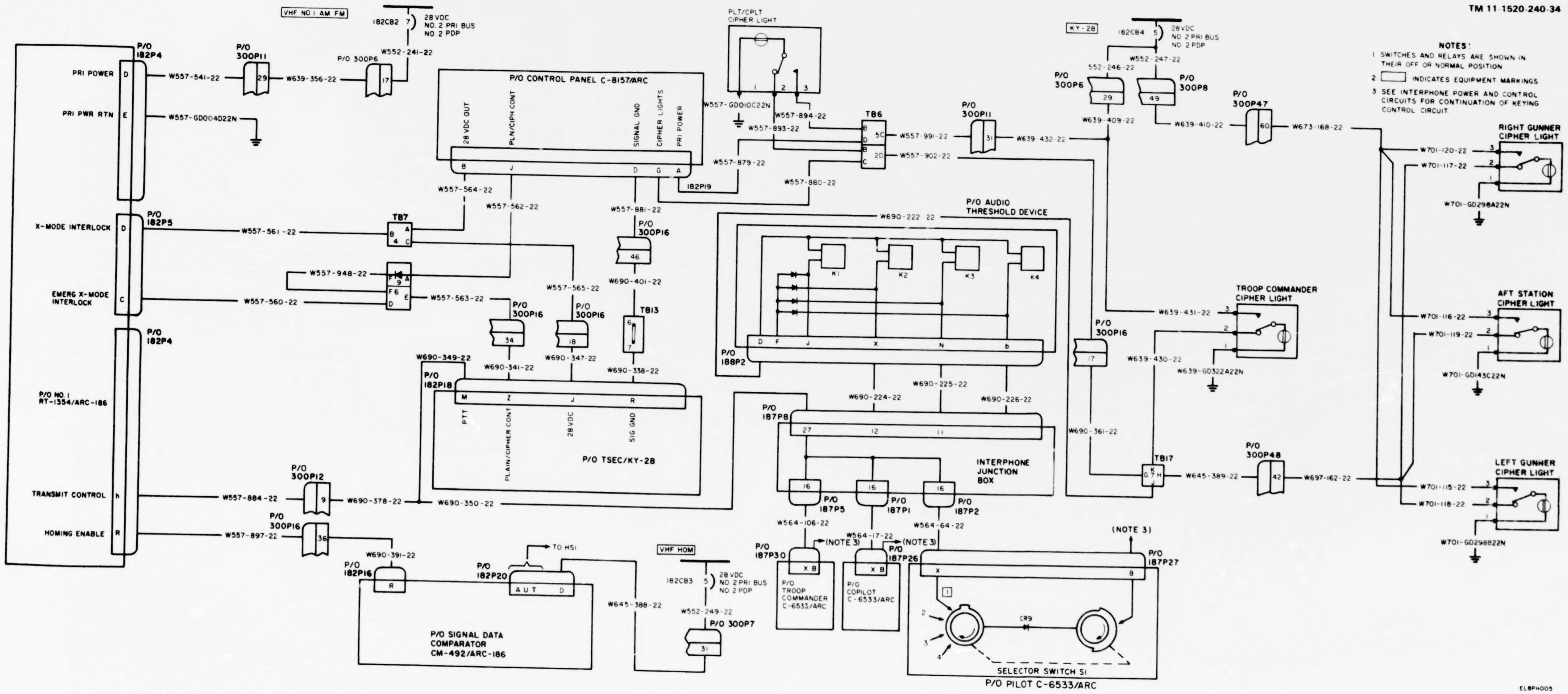
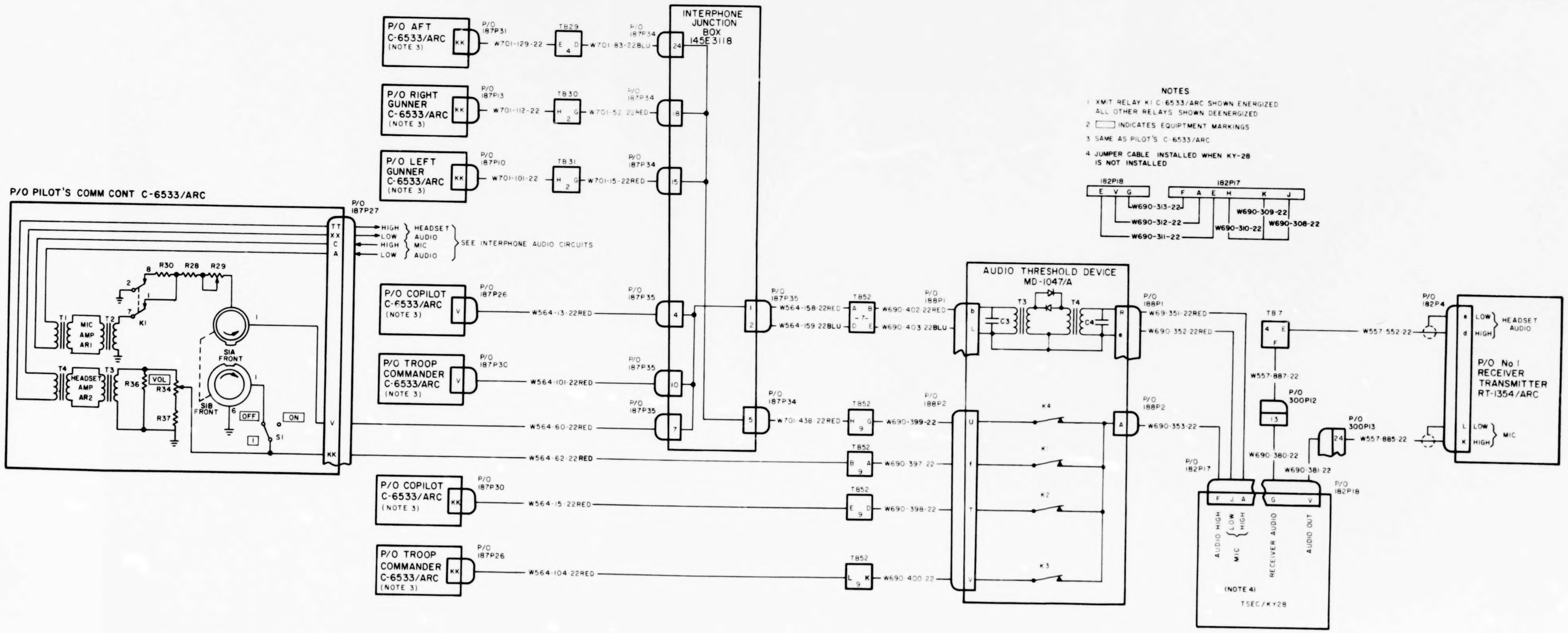

VHF NO 1 AM FM
182CB2
28 VDC
NO. 2 PRI BUS
NO. 2 PDP
W552-241-22
P/O 182P4
PRI POWER
PRI PWR RTN
W557-541-22
W557-GD004D22N
P/O 300P11
W639-356-22
P/O 300P6
P/O CONTROL PANEL C-8157/ARC
28 VDC OUT
PLN/CIPH CONT
SIGNAL GND
CIPHER LIGHTS
PRI POWER
182P19
PLT/CPLT CIPHER LIGHT
W557-GD010C22N
W557-894-22
W557-893-22
W557-879-22
W557-880-22
TB6
W557-991-22
W557-902-22
P/O 300P11
W639-432-22
KY-28
182CB4
552-246-22
W552-247-22
P/O 300P6
P/O 300P8
W639-409-22
W639-410-22
P/O 300P47
W673-168-22
RIGHT GUNNER CIPHER LIGHT
W701-120-22
W701-117-22
W701-GD298A22N
X-MODE INTERLOCK
P/O 182P5
W557-561-22
TB7
W557-564-22
W557-562-22
W557-881-22
P/O 300P16
W690-401-22
TB13
W557-948-22
EMERG X-MODE INTERLOCK
W557-560-22
W557-563-22
W557-565-22
P/O 300P16
P/O 300P16
W690-222-22
P/O AUDIO THRESHOLD DEVICE
K1
K2
K3
K4
P/O 188P2
W690-349-22
W690-341-22
W690-347-22
W690-338-22
P/O 182P18
PTT
PLAIN/CIPHER CONT
28VDC
SIG GND
P/O TSEC/KY-28
P/O 182P4
P/O NO.1 RT-1354/ARC-186
W690-224-22
W690-225-22
W690-226-22
P/O 187P8
INTERPHONE JUNCTION BOX
P/O 300P16
W690-361-22
W639-431-22
W639-430-22
W639-GD322A22N
TROOP COMMANDER CIPHER LIGHT
AFT STATION CIPHER LIGHT
W701-116-22
W701-119-22
W701-GD143C22N
TB17
W645-389-22
P/O 300P48
W697-162-22
LEFT GUNNER CIPHER LIGHT
W701-115-22
W701-118-22
W701-GD298B22N
TRANSMIT CONTROL
W557-884-22
P/O 300P12
W690-378-22
W690-350-22
HOMING ENABLE
W557-897-22
P/O 300P16
P/O 187P5
P/O 187P1
P/O 187P2
W564-106-22
W564-17-22
W564-64-22
(NOTE 3)
(NOTE 3)
(NOTE 3)
W690-391-22
P/O 182P16
P/O 182P20
TO HSI
VHF HOM
182CB3
28 VDC
NO. 2 PRI BUS
NO. 2 PDP
W645-388-22
W552-249-22
P/O 300P7
P/O 187P30
P/O TROOP COMMANDER C-6533/ARC
P/O 187P26
P/O COPILOT C-6533/ARC
P/O 187P27
CR9
SELECTOR SWITCH S1
P/O SIGNAL DATA COMPARATOR CM-492/ARC-186
P/O PILOT C-6533/ARC
EL8PH005

Figure FO-4. No. 1 VHF AM/FM communication, security, and homing facility (AN/ARC-186) power and control circuits


P/O AFT
C-6533/ARC
(NOTE 3)
KK
P/O
187P31
W701-129-22
TB29
E 4 D
W701-83-22BLU
P/O
187P34
24
INTERPHONE
JUNCTION
BOX
145E3118
P/O RIGHT
GUNNER
C-6533/ARC
(NOTE 3)
P/O
187P13
W701-112-22
TB30
H 2 G
W701-52 22RED
P/O
187P34
18
P/O LEFT
GUNNER
C-6533/ARC
(NOTE 3)
P/O
187P10
W701-101-22
TB31
H 2 G
W701-15-22RED
P/O
187P34
15
P/O PILOT'S COMM CONT C-6533/ARC
P/O
187P27
TT
XX
C
A
HIGH
LOW
HIGH
LOW
HEADSET
AUDIO
MIC
AUDIO
SEE INTERPHONE AUDIO CIRCUITS
R30
R28
R29
T1
MIC
AMP
AR1
T2
K1
T4
HEADSET
AMP
AR2
T3
R36
VOL
R34
R37
S1A
FRONT
S1B
FRONT
OFF
ON
S1
V
KK
P/O COPILOT
C-6533/ARC
(NOTE 3)
V
P/O
187P26
W564-13-22RED
P/O
187P35
4
P/O TROOP
COMMANDER
C-6533/ARC
(NOTE 3)
P/O
187P30
W564-101-22RED
P/O
187P35
10
W564-60-22RED
P/O
187P35
7
W564-62-22RED
P/O COPILOT
C-6533/ARC
(NOTE 3)
KK
P/O
187P30
W564-15-22RED
P/O TROOP
COMMANDER
C-6533/ARC
(NOTE 3)
KK
P/O
187P26
W564-104-22RED
P/O
187P35
W564-158-22RED
W564-159 22BLU
TB52
A B
-7-
D E
P/O
187P34
5
W701-438-22RED
TB52
H 9 G
TB52
B 9 A
TB52
E 9 D
TB52
L 9 K
W690-402 22RED
W690-403 22BLU
W690-399-22
W690-397 22
W690-398-22
W690-400 22
P/O
188P1
P/O
188P2
AUDIO THRESHOLD DEVICE
MD-1047/A
C3
T3
T4
C4
b
L
R
U
f
T
V
K4
K1
K2
K3
A
P/O
188P1
W69-351-22RED
W690-352-22RED
P/O
188P2
W690-353-22
TB7
4 E
F
W557-887-22
P/O
300P12
13
W690-380-22
W690-381-22
P/O
300P13
24
W557-885-22
W557-552-22
P/O
182P17
P/O
182P18
F J A
G V
AUDIO HIGH
MIC LOW HIGH
RECEIVER AUDIO
AUDIO OUT
(NOTE 4)
TSEC/KY28
P/O
182P4
LOW
HIGH
HEADSET
AUDIO
L LOW
K HIGH
MIC
P/O No 1
RECEIVER
TRANSMITTER
RT-1354/ARC
182P18
E V G
182P17
F A E H K J
W690-313-22
W690-312-22
W690-311-22
W690-310-22
W690-309-22
W690-308-22

NOTES

1 XMIT RELAY K1 C-6533/ARC SHOWN ENERGIZED
ALL OTHER RELAYS SHOWN DEENERGIZED

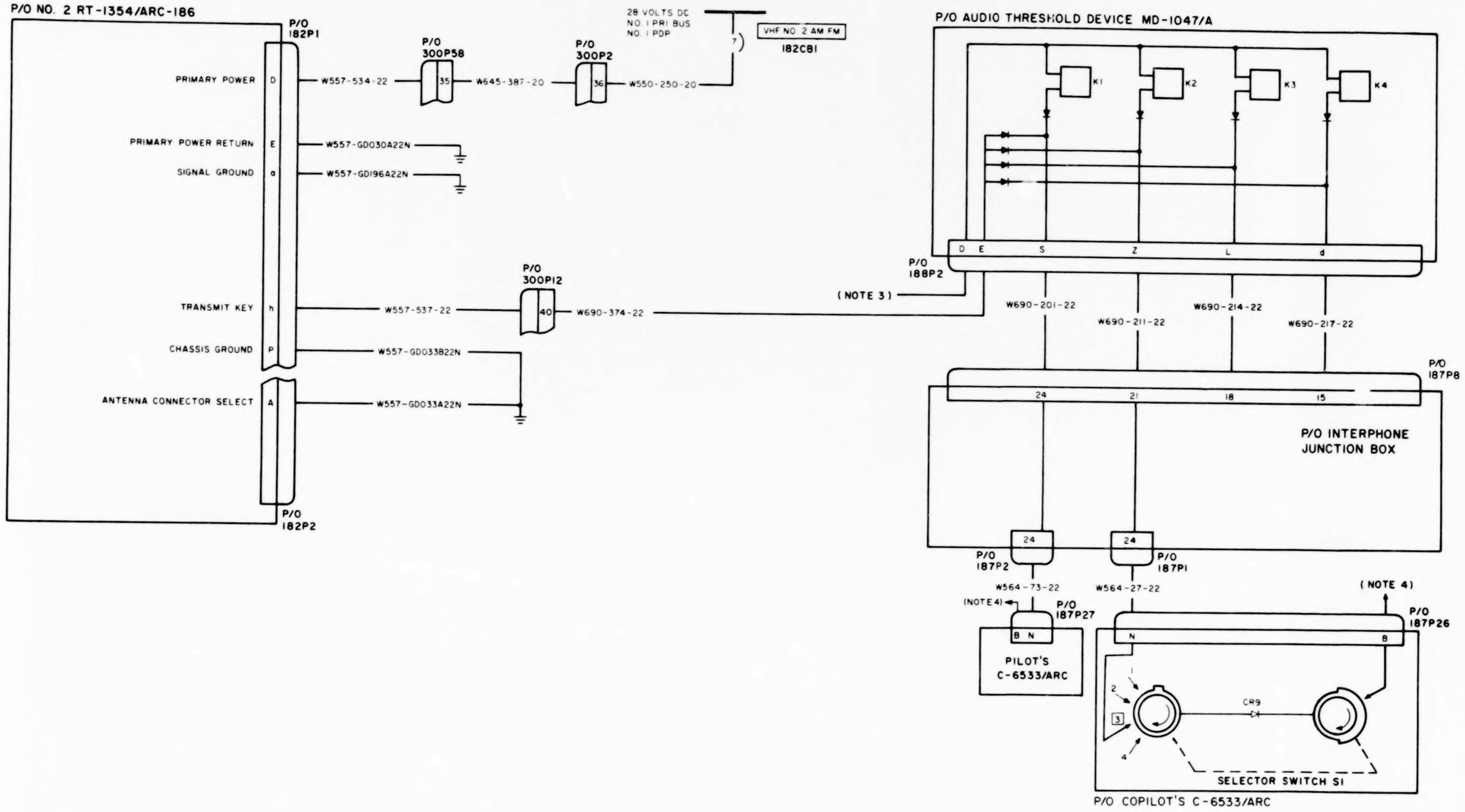
2 ☐ INDICATES EQUIPTMENT MARKINGS

3 SAME AS PILOT'S C-6533/ARC

4 JUMPER CABLE INSTALLED WHEN KY-28
IS NOT INSTALLED

EL8PH006

Figure FO-5. No. 1 VHF AM/FM communication, security, and homing facility (AN/ARC-186) audio circuits

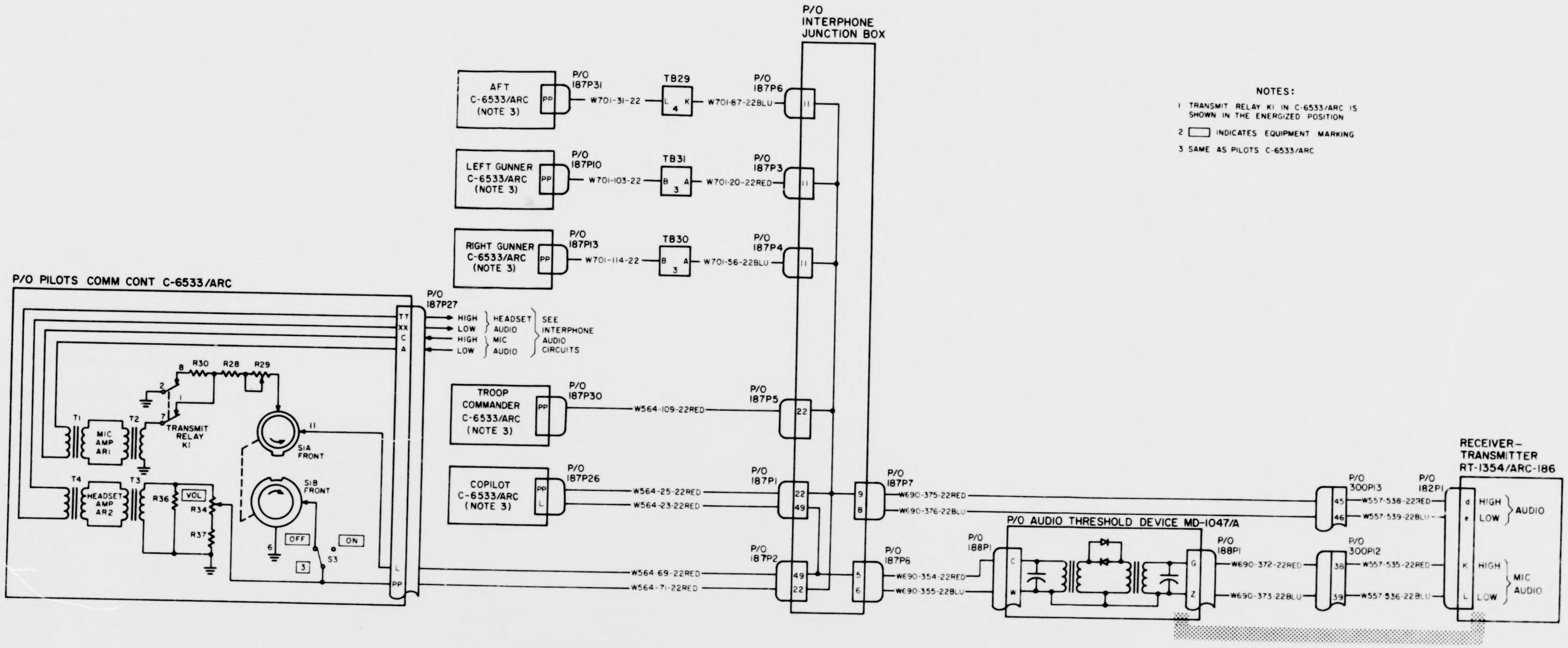

P/O NO. 2 RT-1354/ARC-186
P/O 182P1
PRIMARY POWER
D
W557-534-22
P/O 300P58
35
W645-387-20
P/O 300P2
36
W550-250-20
28 VOLTS DC
NO. 1 PRI BUS
NO. 1 PDP
7
VHF NO. 2 AM FM
182CB1
PRIMARY POWER RETURN
E
W557-GD030A22N
SIGNAL GROUND
a
W557-GD196A22N
TRANSMIT KEY
h
W557-537-22
P/O 300P12
40
W690-374-22
(NOTE 3)
CHASSIS GROUND
P
W557-GD033B22N
ANTENNA CONNECTOR SELECT
A
W557-GD033A22N
P/O 182P2
P/O AUDIO THRESHOLD DEVICE MD-1047/A
K1
K2
K3
K4
D
E
S
Z
L
d
P/O 188P2
W690-201-22
W690-211-22
W690-214-22
W690-217-22
P/O 187P8
24
21
18
15
P/O INTERPHONE JUNCTION BOX
24
24
P/O 187P2
P/O 187P1
W564-73-22
W564-27-22
(NOTE 4)
P/O 187P27
B N
PILOT'S C-6533/ARC
(NOTE 4)
P/O 187P26
N
B
1
2
3
4
CR9
SELECTOR SWITCH S1
P/O COPILOT'S C-6533/ARC

NOTES

1. SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
2. ▭ INDICATES EQUIPMENT MARKINGS
3. 28-VOLTS DC APPLIED WHEN KY-28 OPERATED IN CIPHER MODE
4. SEE INTERPHONE POWER AND CONTROL CIRCUITS FOR CONTINUATION OF KEYING CONTROL CIRCUIT

ELBPH007

Figure FO-6. No. 2 VHF AM/FM facility (AN/ARC-186) power and control circuits


P/O INTERPHONE JUNCTION BOX
AFT C-6533/ARC (NOTE 3)
PP
P/O 187P31
W701-31-22
TB29
L K 4
W701-87-22BLU
P/O 187P6
11
LEFT GUNNER C-6533/ARC (NOTE 3)
P/O 187P10
W701-103-22
TB31
B A 3
W701-20-22RED
P/O 187P3
RIGHT GUNNER C-6533/ARC (NOTE 3)
P/O 187P13
W701-114-22
TB30
W701-56-22BLU
P/O 187P4
P/O PILOTS COMM CONT C-6533/ARC
P/O 187P27
TT
XX
C
A
HIGH
LOW
HIGH
LOW
HEADSET AUDIO
MIC AUDIO
SEE INTERPHONE AUDIO CIRCUITS
R30
R28
R29
8
2
1
7
TRANSMIT RELAY K1
T1
MIC AMP AR1
T2
S1A FRONT
11
T4
HEADSET AMP AR2
T3
R36
VOL
R34
R37
S1B FRONT
6
OFF
ON
S3
3
L
PP
TROOP COMMANDER C-6533/ARC (NOTE 3)
P/O 187P30
W564-109-22RED
P/O 187P5
22
COPILOT C-6533/ARC (NOTE 3)
P/O 187P26
W564-25-22RED
W564-23-22RED
P/O 187P1
22
49
P/O 187P2
49
22
W564-69-22RED
W564-71-22RED
P/O 187P7
9
8
W690-375-22RED
W690-376-22BLU
P/O 187P6
5
6
W690-354-22RED
W690-355-22BLU
P/O AUDIO THRESHOLD DEVICE MD-1047/A
P/O 188P1
C
W
G
Z
P/O 188P1
W690-372-22RED
W690-373-22BLU
P/O 300P13
45
46
W557-538-22RED
W557-539-22BLU
P/O 300P12
38
39
W557-535-22RED
W557-536-22BLU
P/O 182P1
RECEIVER-TRANSMITTER RT-1354/ARC-186
d
e
HIGH
LOW
AUDIO
K
L
HIGH
LOW
MIC AUDIO
EL8PH008

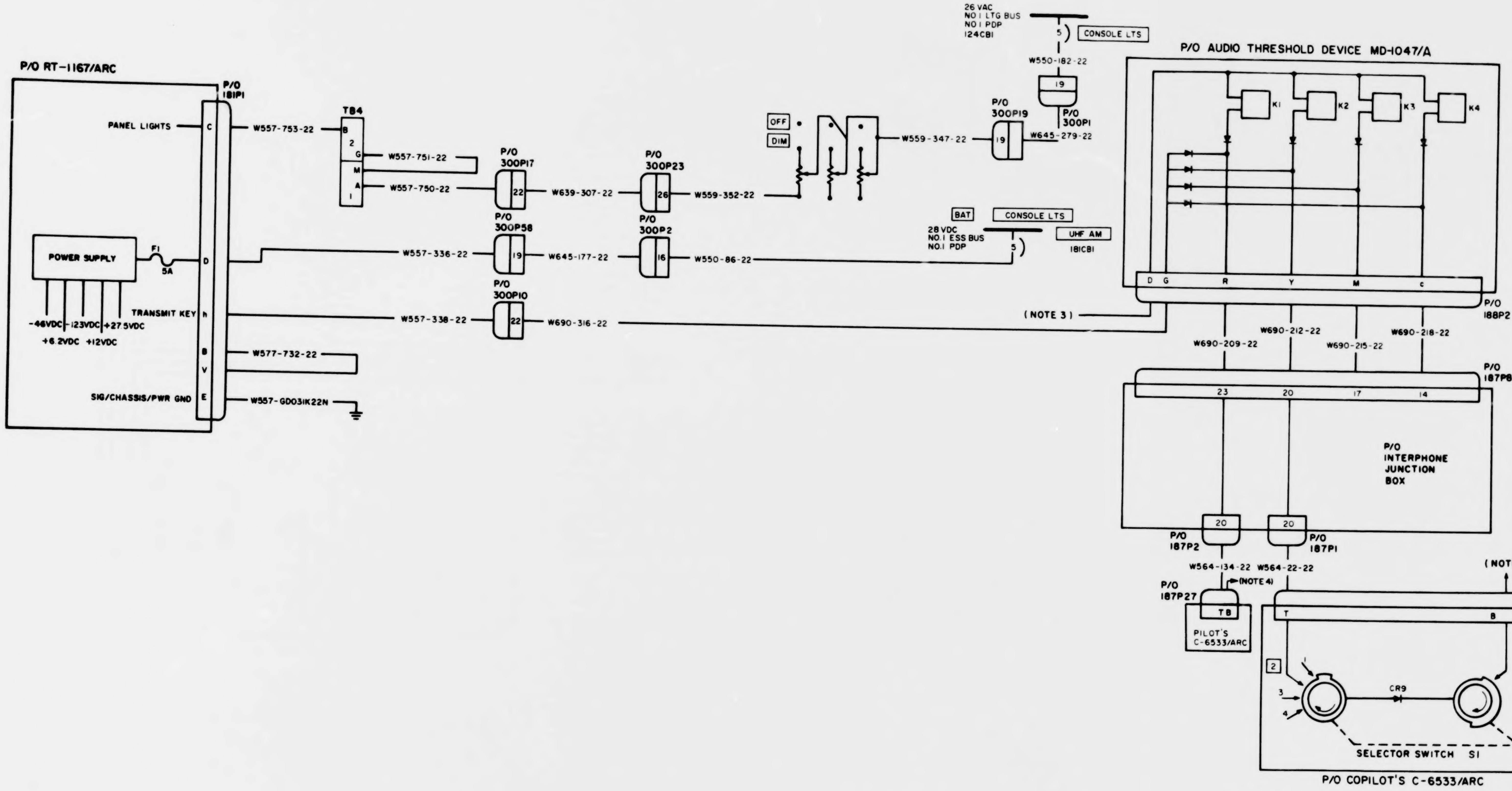
NOTES:

1 TRANSMIT RELAY K1 IN C-6533/ARC IS SHOWN IN THE ENERGIZED POSITION

2 ▭ INDICATES EQUIPMENT MARKING

3 SAME AS PILOTS C-6533/ARC

Figure FO-7. No. 2 VHF AM/FM facility (AN/ARC-186) audio circuits

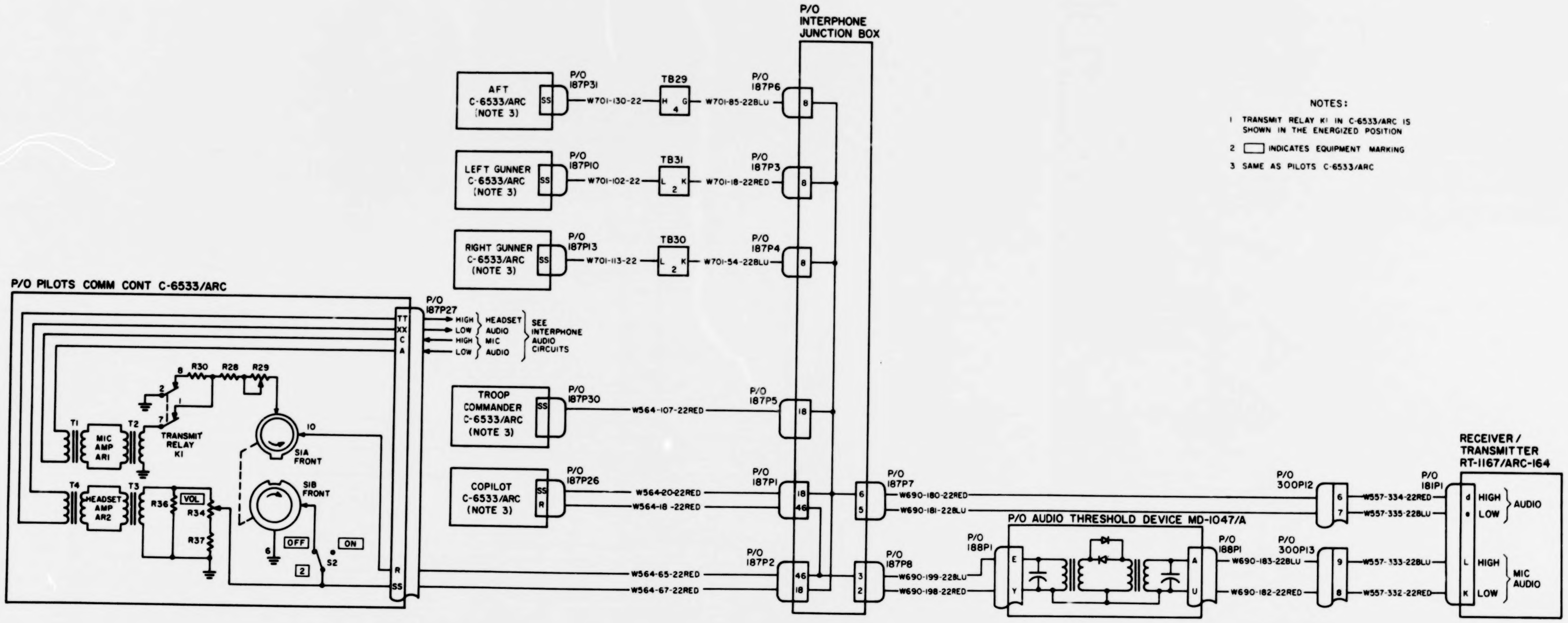

P/O RT-1167/ARC
P/O 181P1
PANEL LIGHTS
C
POWER SUPPLY
F1
5A
D
-46VDC
+6.2VDC
-123VDC
+12VDC
+27.5VDC
TRANSMIT KEY
h
B
V
SIG/CHASSIS/PWR GND
E
W557-753-22
TB4
B
2
G
M
A
1
W557-751-22
W557-750-22
W557-336-22
W557-338-22
W577-732-22
W557-GD031K22N
P/O 300P17
22
P/O 300P58
19
P/O 300P10
22
W639-307-22
W645-177-22
W690-316-22
P/O 300P23
26
P/O 300P2
16
W559-352-22
W550-86-22
OFF
DIM
W559-347-22
P/O 300P19
19
W645-279-22
26 VAC
NO 1 LTG BUS
NO 1 PDP
124CB1
5
CONSOLE LTS
W550-182-22
19
P/O 300P1
BAT
CONSOLE LTS
28 VDC
NO.1 ESS BUS
NO.1 PDP
5
UHF AM
181CB1
(NOTE 3)
P/O AUDIO THRESHOLD DEVICE MD-1047/A
K1
K2
K3
K4
D
G
R
Y
M
c
P/O 188P2
W690-209-22
W690-212-22
W690-215-22
W690-218-22
P/O 187P8
23
20
17
14
P/O INTERPHONE JUNCTION BOX
20
20
P/O 187P2
P/O 187P1
W564-134-22
W564-22-22
(NOTE 4)
(NOTE 4)
P/O 187P27
TB
PILOT'S C-6533/ARC
P/O 187P26
T
B
2
1
3
4
CR9
SELECTOR SWITCH S1
P/O COPILOT'S C-6533/ARC

NOTES:

1. SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
2. ☐ INDICATES EQUIPMENT MARKINGS
3. 28-VOLTS DC APPLIED WHEN KY-28 OPERATED IN CIPHER MODE
4. SEE INTERPHONE POWER AND CONTROL CIRCUITS FOR CONTINUATION OF KEYING CONTROL CIRCUIT

EL8PH009

Figure FO-8. UHF AM command facility (AN/ARC-164) power and control circuits


P/O
INTERPHONE
JUNCTION BOX
AFT
C-6533/ARC
(NOTE 3)
SS
P/O
187P31
W701-130-22
TB29
H
4
G
W701-85-22BLU
P/O
187P6
8
LEFT GUNNER
C-6533/ARC
(NOTE 3)
SS
P/O
187P10
W701-102-22
TB31
L
2
K
W701-18-22RED
P/O
187P3
8
RIGHT GUNNER
C-6533/ARC
(NOTE 3)
SS
P/O
187P13
W701-113-22
TB30
L
2
K
W701-54-22BLU
P/O
187P4
8
P/O PILOTS COMM CONT C-6533/ARC
P/O
187P27
TT
XX
C
A
HIGH
LOW
HEADSET
AUDIO
HIGH
LOW
MIC
AUDIO
SEE
INTERPHONE
AUDIO
CIRCUITS
8
R30
R28
R29
2
1
7
T1
MIC
AMP
AR1
T2
TRANSMIT
RELAY
K1
10
S1A
FRONT
T4
HEADSET
AMP
AR2
T3
R36
VOL
R34
R37
S1B
FRONT
6
OFF
ON
S2
2
R
SS
TROOP
COMMANDER
C-6533/ARC
(NOTE 3)
SS
P/O
187P30
W564-107-22RED
P/O
187P5
18
COPILOT
C-6533/ARC
(NOTE 3)
SS
R
P/O
187P26
W564-20-22RED
W564-18-22RED
P/O
187P1
18
46
P/O
187P7
6
5
W690-180-22RED
W690-181-22BLU
W564-65-22RED
W564-67-22RED
P/O
187P2
46
18
P/O
187P8
3
2
W690-199-22BLU
W690-198-22RED
P/O AUDIO THRESHOLD DEVICE MD-1047/A
P/O
188P1
E
Y
A
U
P/O
188P1
W690-183-22BLU
W690-182-22RED
P/O
300P12
6
7
W557-334-22RED
W557-335-22BLU
P/O
300P13
9
8
W557-333-22BLU
W557-332-22RED
RECEIVER /
TRANSMITTER
RT-1167/ARC-164
P/O
181P1
d
e
HIGH
LOW
AUDIO
L
K
HIGH
LOW
MIC
AUDIO
EL8PH010

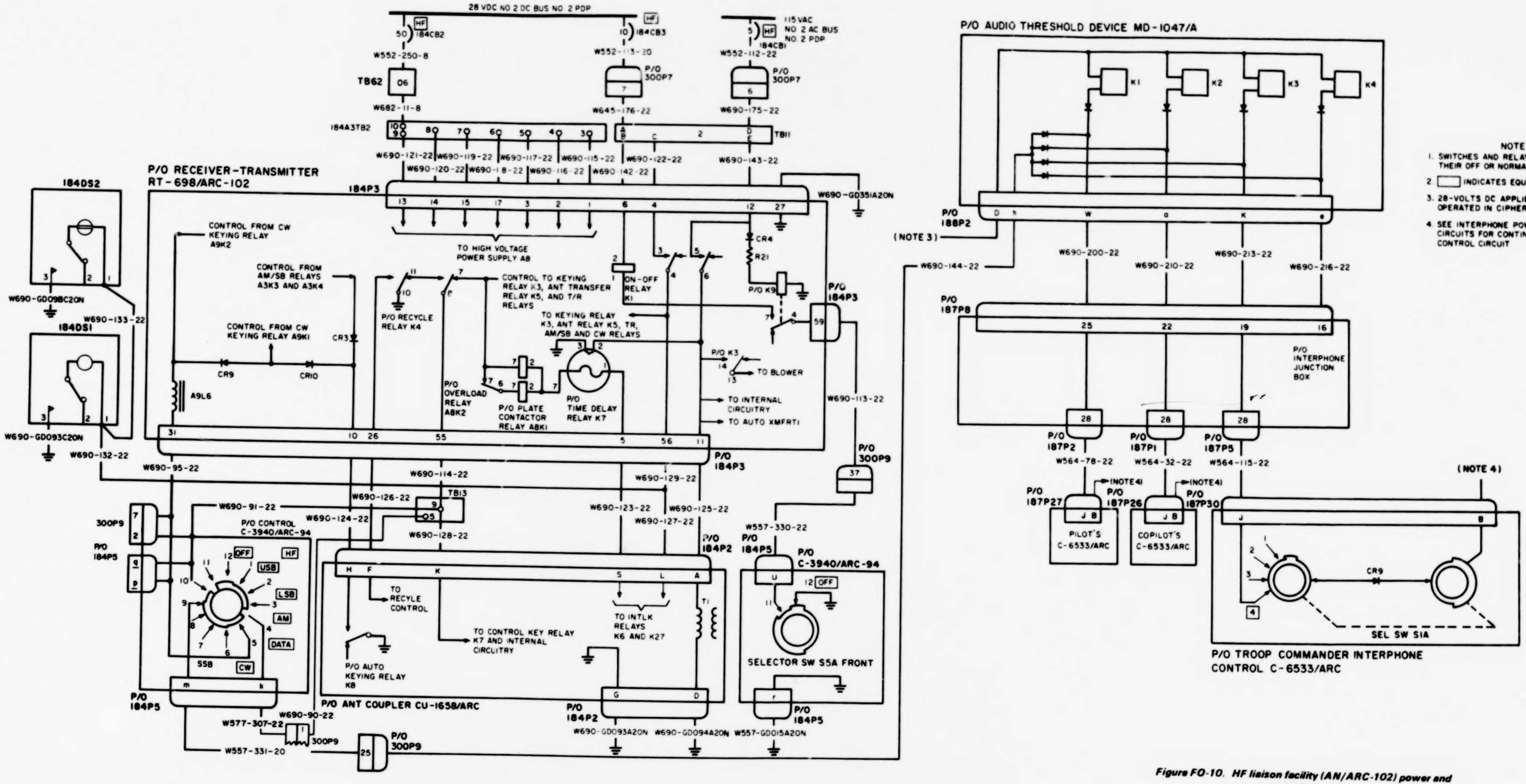
NOTES:

1 TRANSMIT RELAY K1 IN C-6533/ARC IS SHOWN IN THE ENERGIZED POSITION

2 ▭ INDICATES EQUIPMENT MARKING

3 SAME AS PILOTS C-6533/ARC

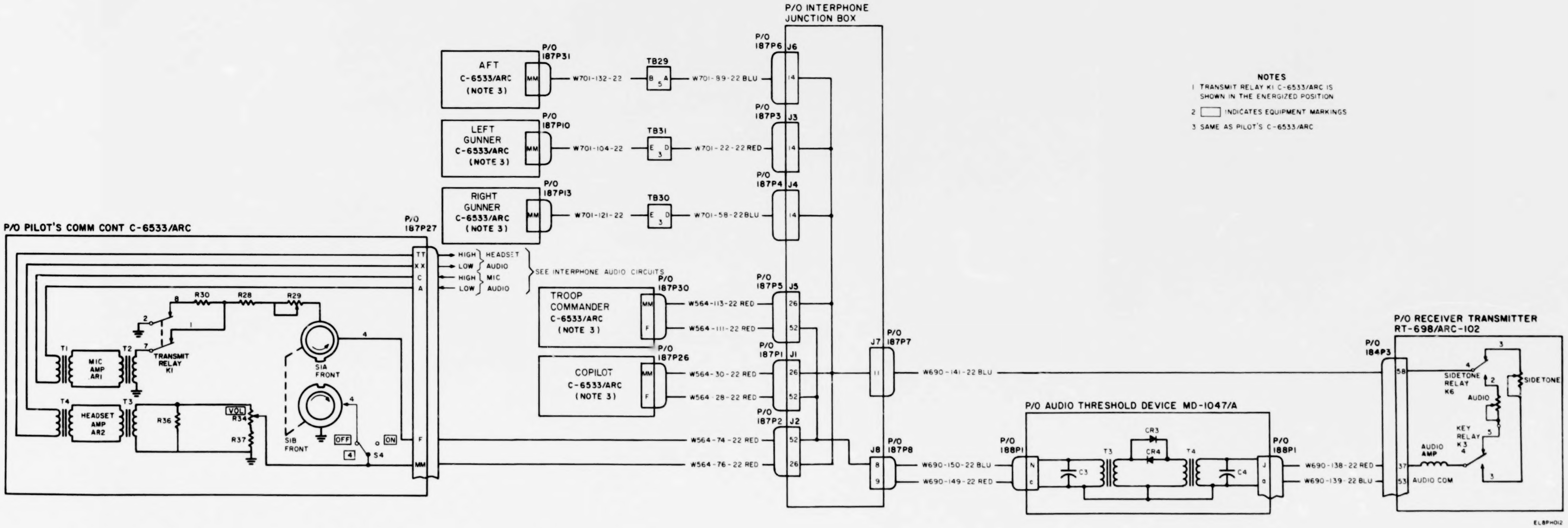
Figure FO-9. UHF AM command facility (AN/ARC-164) audio circuits


28 VDC NO 2 DC BUS NO 2 PDP
HF
184CB2
184CB3
115 VAC
NO 2 AC BUS
NO 2 PDP
184CB1
W552-250-8
W552-113-20
W552-112-22
TB62
P/O
300P7
W682-11-8
W645-176-22
W690-175-22
184A3TB2
TB11
W690-121-22
W690-119-22
W690-117-22
W690-115-22
W690-122-22
W690-143-22
W690-120-22
W690-118-22
W690-116-22
W690-142-22
P/O RECEIVER-TRANSMITTER
RT-698/ARC-102
184P3
W690-GD351A20N
184DS2
W690-GD098C20N
W690-133-22
184DS1
W690-GD093C20N
W690-132-22
CONTROL FROM CW
KEYING RELAY
A9K2
TO HIGH VOLTAGE
POWER SUPPLY A8
CONTROL FROM
AM/SB RELAYS
A3K3 AND A3K4
CONTROL TO KEYING
RELAY K3, ANT TRANSFER
RELAY K5, AND T/R
RELAYS
ON-OFF
RELAY
K1
CR4
R21
P/O K9
P/O RECYCLE
RELAY K4
TO KEYING RELAY
K3, ANT RELAY K5, TR,
AM/SB AND CW RELAYS
CONTROL FROM CW
KEYING RELAY A9K1
CR33
CR9
CR10
A9L6
P/O
OVERLOAD
RELAY
A8K2
P/O PLATE
CONTACTOR
RELAY A8K1
P/O
TIME DELAY
RELAY K7
P/O K3
TO BLOWER
TO INTERNAL
CIRCUITRY
TO AUTO XMFRTI
W690-113-22
W690-95-22
W690-114-22
W690-129-22
P/O
300P9
TB13
W690-91-22
W690-126-22
W690-124-22
W690-128-22
W690-123-22
W690-125-22
W690-127-22
P/O
184P2
P/O CONTROL
C-3940/ARC-94
OFF
HF
USB
LSB
AM
DATA
CW
S5B
P/O
184P5
TO
RECYLE
CONTROL
TO CONTROL KEY RELAY
K7 AND INTERNAL
CIRCUITRY
TO INTLK
RELAYS
K6 AND K27
T1
P/O AUTO
KEYING RELAY
K8
P/O ANT COUPLER CU-1658/ARC
W557-330-22
P/O
C-3940/ARC-94
SELECTOR SW S5A FRONT
W577-307-22
W690-90-22
W557-331-20
W690-GD093A20N
W690-GD094A20N
W557-GD015A20N
P/O AUDIO THRESHOLD DEVICE MD-1047/A
K1
K2
K3
K4
(NOTE 3)
P/O
188P2
W690-144-22
W690-200-22
W690-210-22
W690-213-22
W690-216-22
P/O
187P8
P/O
INTERPHONE
JUNCTION
BOX
P/O
187P2
P/O
187P1
P/O
187P5
W564-78-22
W564-32-22
W564-115-22
(NOTE 4)
P/O
187P27
P/O
187P26
P/O
187P30
PILOT'S
C-6533/ARC
COPILOT'S
C-6533/ARC
CR9
SEL SW S1A
P/O TROOP COMMANDER INTERPHONE
CONTROL C-6533/ARC

NOTES:
1. SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
2. ☐ INDICATES EQUIPMENT MARKINGS
3. 28-VOLTS DC APPLIED WHEN KY-28 OPERATED IN CIPHER MODE
4. SEE INTERPHONE POWER AND CONTROL CIRCUITS FOR CONTINUATION OF KEYING CONTROL CIRCUIT

Figure FO-10. HF liaison facility (AN/ARC-102) power and control circuits

EL8PH011


P/O PILOT'S COMM CONT C-6533/ARC
P/O 187P27
TT
XX
C
A
F
MM
HIGH
LOW
HIGH
LOW
HEADSET AUDIO
MIC AUDIO
SEE INTERPHONE AUDIO CIRCUITS
T1
MIC AMP AR1
T2
TRANSMIT RELAY K1
R30
R28
R29
S1A FRONT
S1B FRONT
T4
HEADSET AMP AR2
T3
R36
VOL
R34
R37
OFF
ON
4
S4
AFT C-6533/ARC (NOTE 3)
P/O 187P31
W701-132-22
TB29
W701-89-22 BLU
LEFT GUNNER C-6533/ARC (NOTE 3)
P/O 187P10
W701-104-22
TB31
W701-22-22 RED
RIGHT GUNNER C-6533/ARC (NOTE 3)
P/O 187P13
W701-121-22
TB30
W701-58-22BLU
TROOP COMMANDER C-6533/ARC (NOTE 3)
P/O 187P30
W564-113-22 RED
W564-111-22 RED
COPILOT C-6533/ARC (NOTE 3)
P/O 187P26
W564-30-22 RED
W564-28-22 RED
W564-74-22 RED
W564-76-22 RED
P/O INTERPHONE JUNCTION BOX
P/O 187P6 J6
P/O 187P3 J3
P/O 187P4 J4
P/O 187P5 J5
P/O 187P1 J1
P/O 187P2 J2
J7 P/O 187P7
J8 P/O 187P8
W690-141-22 BLU
W690-150-22 BLU
W690-149-22 RED
P/O AUDIO THRESHOLD DEVICE MD-1047/A
P/O 188P1
C3
T3
CR3
CR4
T4
C4
P/O 188P1
W690-138-22 RED
W690-139-22 BLU
P/O RECEIVER TRANSMITTER RT-698/ARC-102
P/O 184P3
SIDETONE RELAY K6
SIDETONE
AUDIO
KEY RELAY K3
AUDIO AMP
AUDIO COM
EL8PH012

NOTES
1 TRANSMIT RELAY K1 C-6533/ARC IS SHOWN IN THE ENERGIZED POSITION
2 ☐ INDICATES EQUIPMENT MARKINGS
3 SAME AS PILOT'S C-6533/ARC

Figure FO-11. HF liaison facility (AN/ARC-102) audio circuits

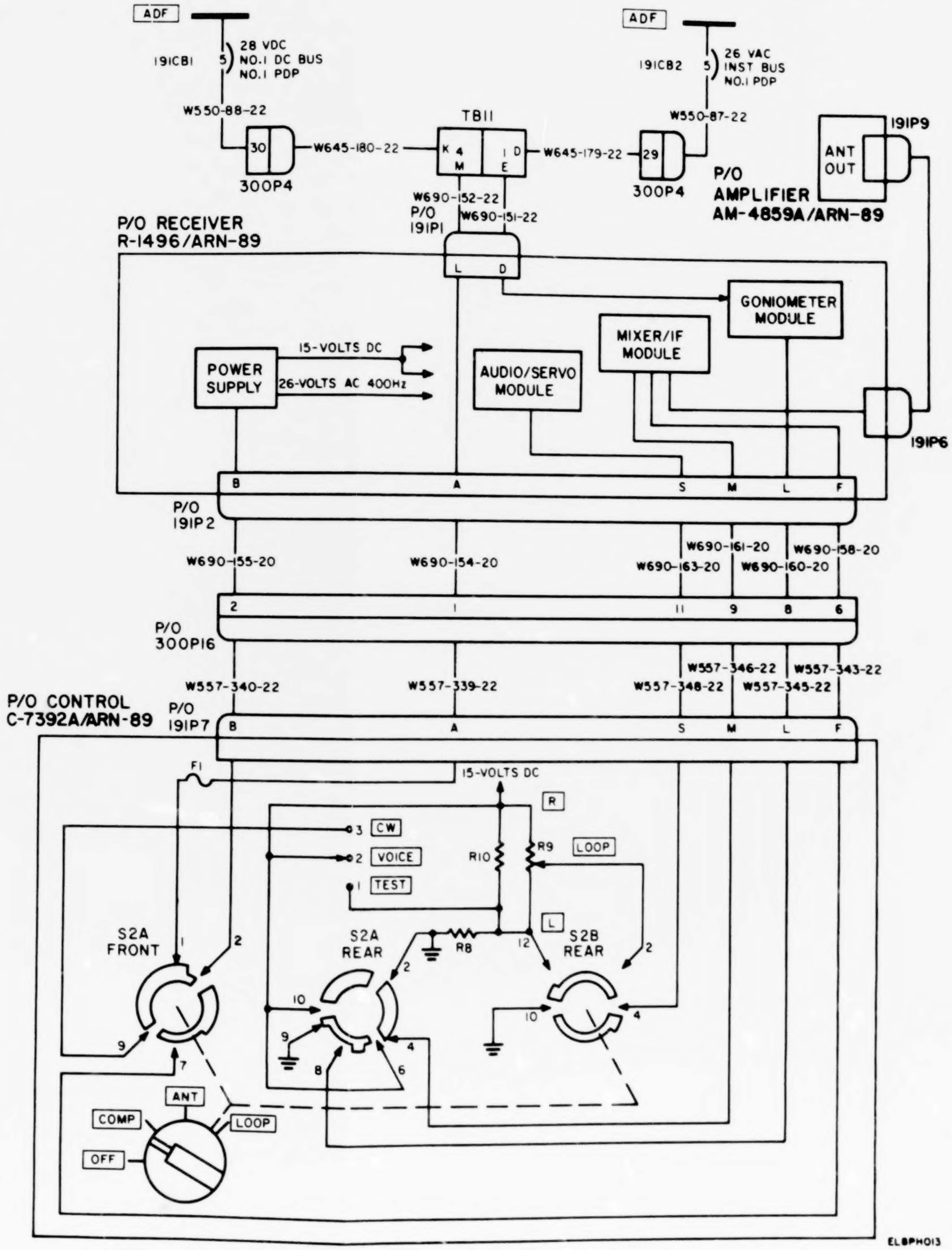
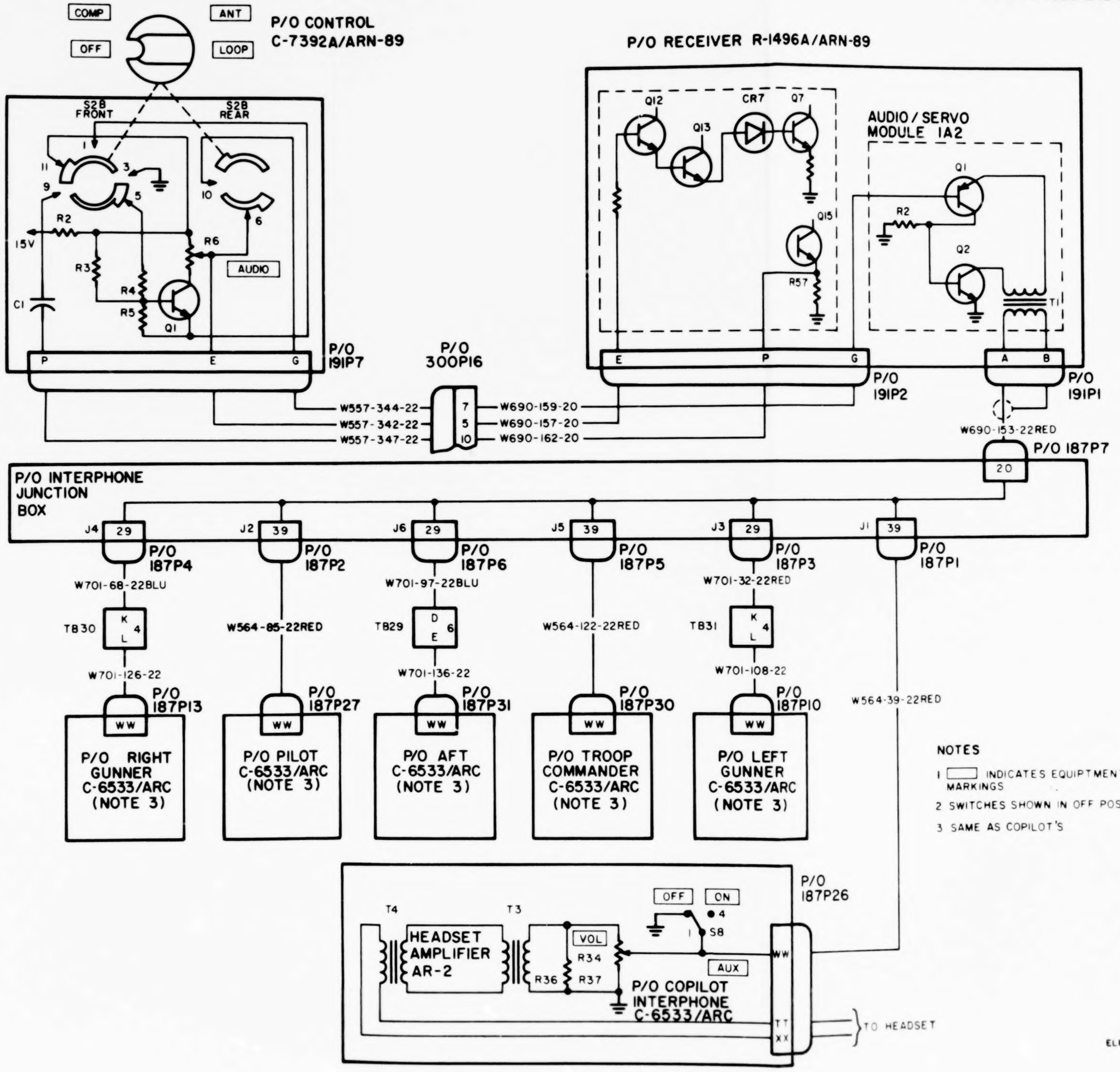

ADF
191CB1
5
28 VDC
NO.1 DC BUS
NO.1 PDP
W550-88-22
30
300P4
W645-180-22
TB11
K 4 M
1 D E
W645-179-22
29
300P4
ADF
191CB2
5
26 VAC
INST BUS
NO.1 PDP
W550-87-22
191P9
ANT OUT
P/O
AMPLIFIER
AM-4859A/ARN-89
W690-152-22
P/O
191P1
W690-151-22
P/O RECEIVER
R-1496/ARN-89
L
D
GONIOMETER MODULE
MIXER/IF MODULE
POWER SUPPLY
15-VOLTS DC
26-VOLTS AC 400Hz
AUDIO/SERVO MODULE
191P6
B
A
S
M
L
F
P/O
191P2
W690-155-20
W690-154-20
W690-161-20
W690-163-20
W690-160-20
W690-158-20
2
1
11
9
8
6
P/O
300P16
W557-340-22
W557-339-22
W557-346-22
W557-348-22
W557-345-22
W557-343-22
P/O CONTROL
C-7392A/ARN-89
P/O
191P7
B
A
S
M
L
F
F1
15-VOLTS DC
R
3 CW
2 VOICE
1 TEST
R10
R9
LOOP
L
R8
12
S2A
FRONT
1
2
9
7
S2A
REAR
2
10
9
8
6
4
S2B
REAR
2
10
4
ANT
COMP
LOOP
OFF
EL8PH013

Figure FO-12. Direction finder facility (AN/ARN-89B) power and control circuits


COMP
ANT
OFF
LOOP
P/O CONTROL
C-7392A/ARN-89
S2B
FRONT
S2B
REAR
1
11
3
9
5
10
6
R2
15V
R6
AUDIO
R3
R4
R5
Q1
C1
P
E
G
P/O
191P7
P/O
300P16
W557-344-22
W557-342-22
W557-347-22
7
5
10
W690-159-20
W690-157-20
W690-162-20
P/O RECEIVER R-1496A/ARN-89
Q12
Q13
CR7
Q7
Q15
R57
AUDIO / SERVO
MODULE 1A2
Q1
R2
Q2
T1
E
P
G
P/O
191P2
A
B
P/O
191P1
W690-153-22RED
P/O 187P7
20
P/O INTERPHONE
JUNCTION
BOX
J4
29
P/O
187P4
J2
39
P/O
187P2
J6
29
P/O
187P6
J5
39
P/O
187P5
J3
29
P/O
187P3
J1
39
P/O
187P1
W701-68-22BLU
TB30
K
L
4
W701-126-22
W564-85-22RED
W701-97-22BLU
TB29
D
E
6
W701-136-22
W564-122-22RED
W701-32-22RED
TB31
K
L
4
W701-108-22
W564-39-22RED
P/O
187P13
WW
P/O RIGHT
GUNNER
C-6533/ARC
(NOTE 3)
P/O
187P27
WW
P/O PILOT
C-6533/ARC
(NOTE 3)
P/O
187P31
WW
P/O AFT
C-6533/ARC
(NOTE 3)
P/O
187P30
WW
P/O TROOP
COMMANDER
C-6533/ARC
(NOTE 3)
P/O
187P10
WW
P/O LEFT
GUNNER
C-6533/ARC
(NOTE 3)
P/O
187P26
T4
T3
OFF
ON
4
1
S8
HEADSET
AMPLIFIER
AR-2
VOL
R34
R36
R37
AUX
P/O COPILOT
INTERPHONE
C-6533/ARC
WW
TT
XX
TO HEADSET
EL8PH014

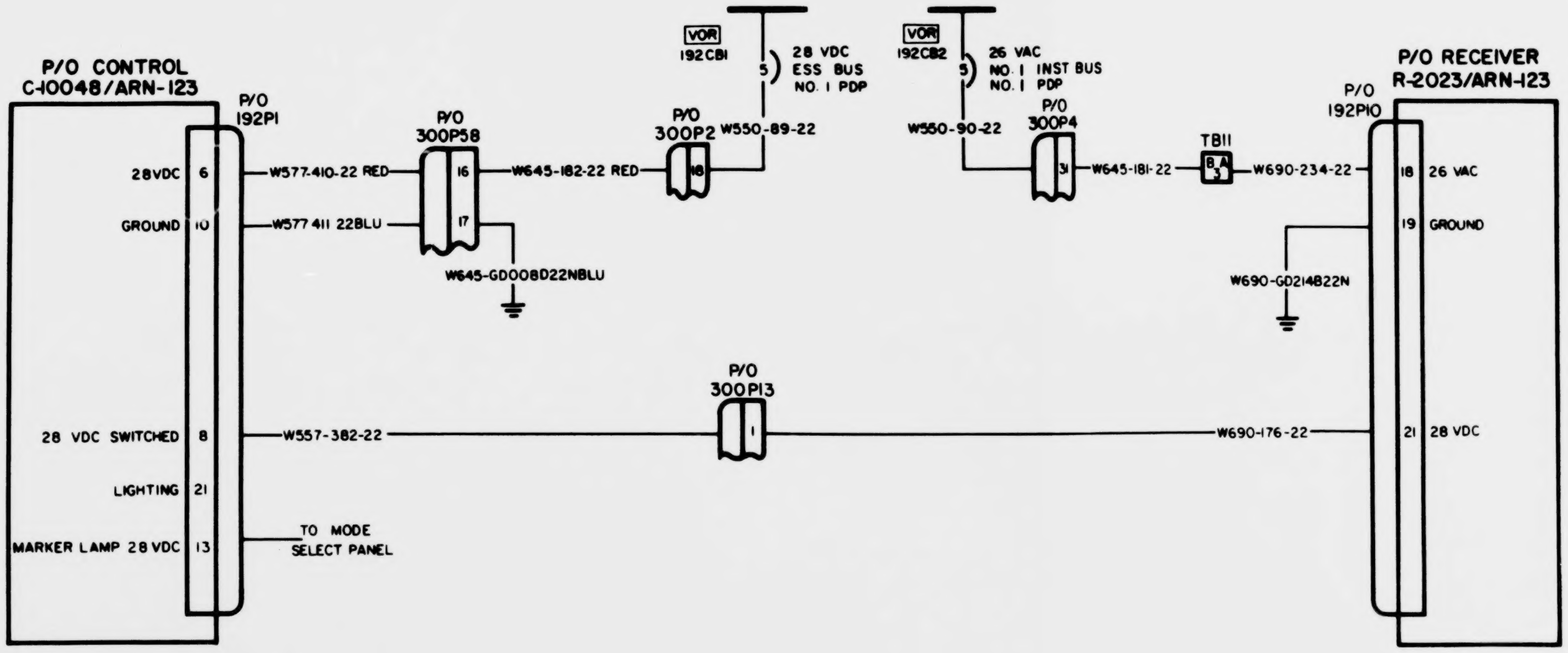
NOTES

1 ☐ INDICATES EQUIPTMENT MARKINGS

2 SWITCHES SHOWN IN OFF POSITION

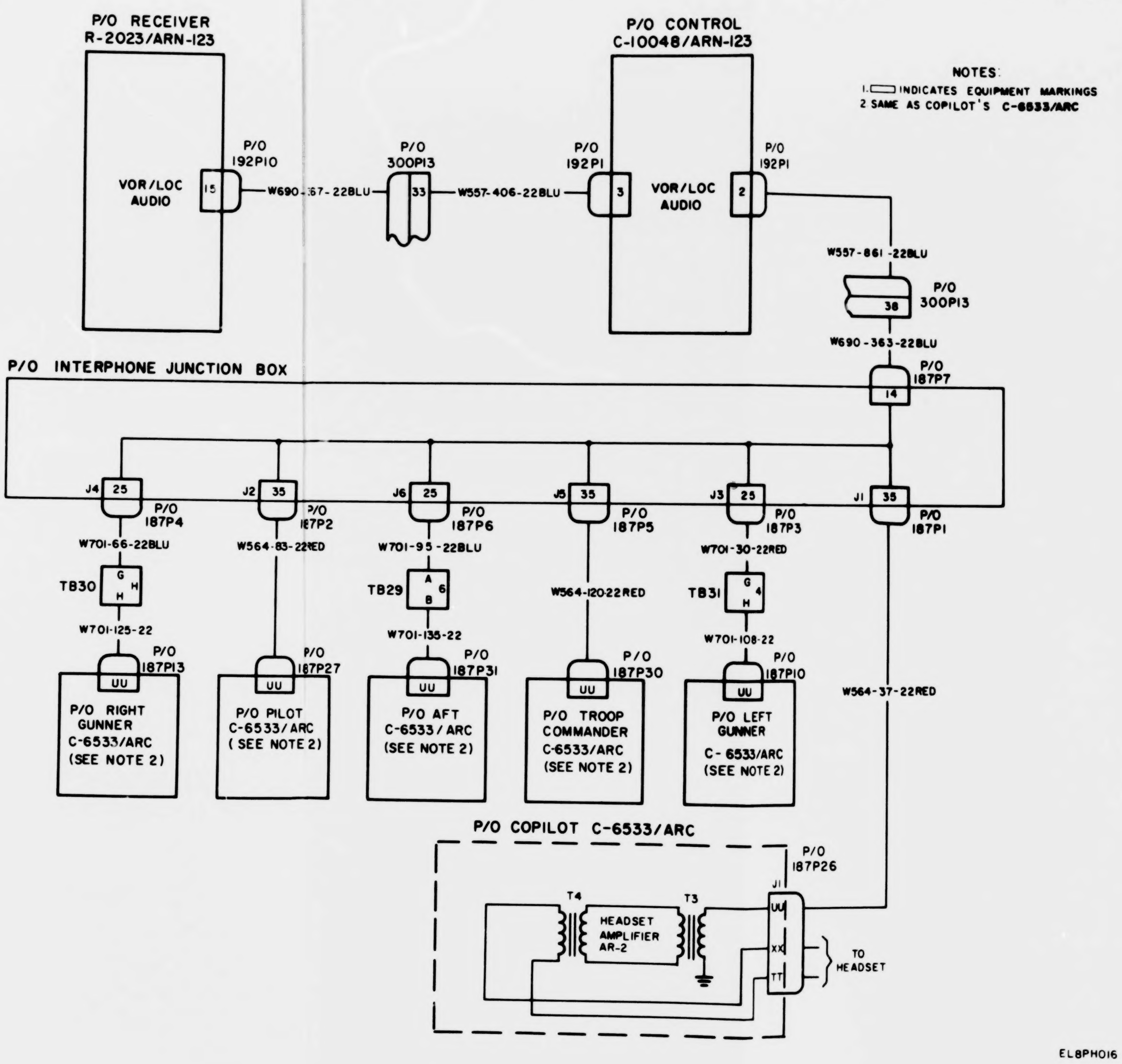
3 SAME AS COPILOT'S

Figure FO-13. Direction finder facility (AN/ARN-89B) audio and rf gain circuits


P/O CONTROL
C-10048/ARN-123
P/O
192P1
28VDC
6
GROUND
10
28 VDC SWITCHED
8
LIGHTING
21
MARKER LAMP 28VDC
13
W577-410-22 RED
W577 411 22BLU
TO MODE
SELECT PANEL
P/O
300P58
16
17
W645-GD008D22NBLU
W645-182-22 RED
P/O
300P2
18
VOR
192CB1
5
28 VDC
ESS BUS
NO. 1 PDP
W550-89-22
VOR
192CB2
5
26 VAC
NO. 1 INST BUS
NO. 1 PDP
W550-90-22
P/O
300P4
31
W645-181-22
TB11
B A
3
W690-234-22
P/O
300P13
1
W557-382-22
W690-176-22
W690-GD214B22N
P/O RECEIVER
R-2023/ARN-123
P/O
192P10
18
26 VAC
19
GROUND
21
28 VDC

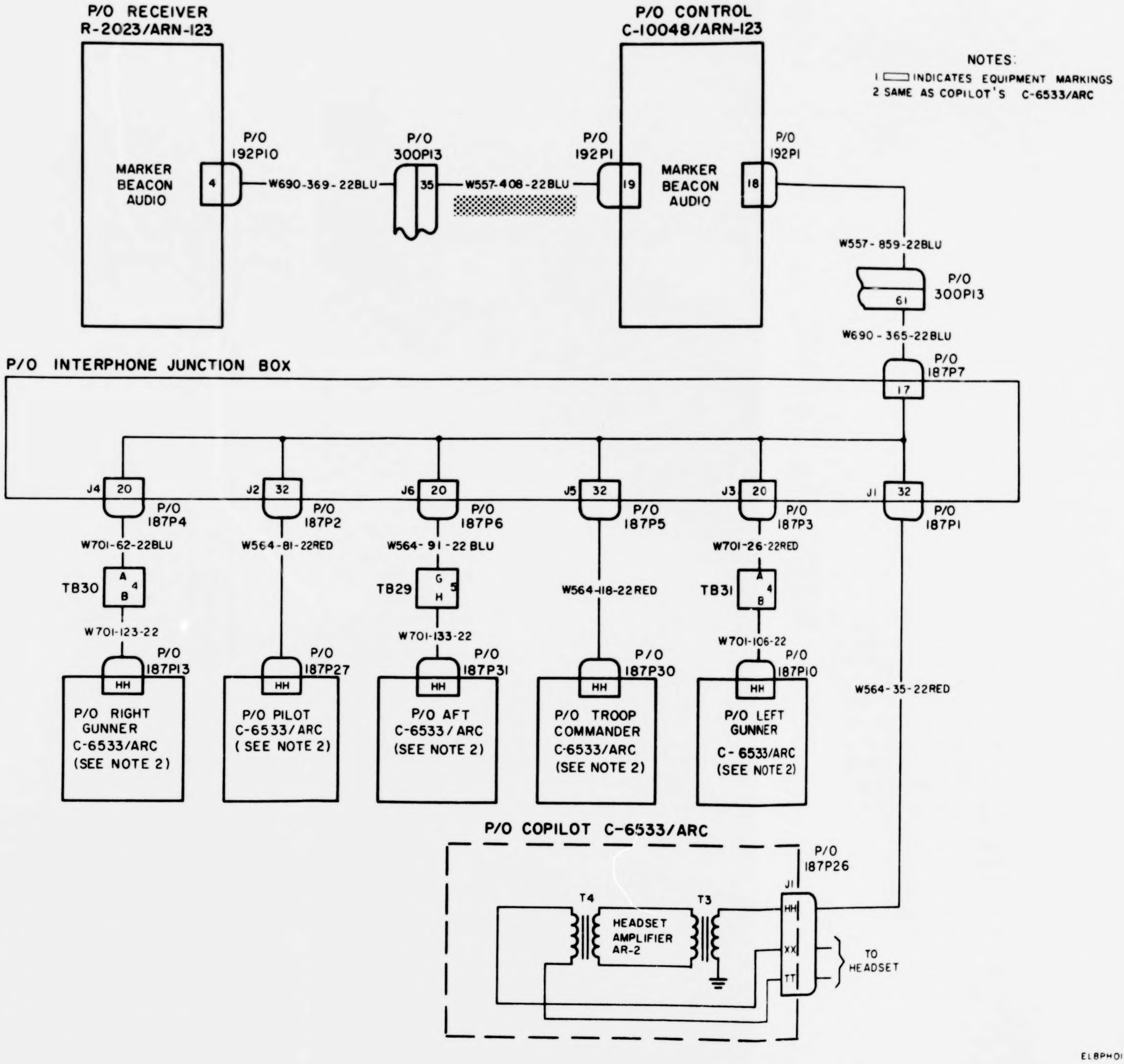
EL8PH015

Figure FO-14. VHF navigation and instrument landing system facility (AN/ARN-123) power and control circuits


P/O RECEIVER
R-2023/ARN-123
VOR/LOC
AUDIO
15
P/O
192P10
W690-[illegible]67-22BLU
P/O
300P13
33
W557-406-22BLU
P/O
192P1
3
P/O CONTROL
C-10048/ARN-123
VOR/LOC
AUDIO
2
P/O
192P1
W557-861-22BLU
38
P/O
300P13
W690-363-22BLU
P/O INTERPHONE JUNCTION BOX
P/O
187P7
14
J4
25
P/O
187P4
J2
35
P/O
187P2
J6
25
P/O
187P6
J5
35
P/O
187P5
J3
25
P/O
187P3
J1
35
P/O
187P1
W701-66-22BLU
W564-83-22RED
W701-95-22BLU
W564-120-22RED
W701-30-22RED
TB30
G
H
H
TB29
A
B
6
TB31
G
H
4
W701-125-22
W701-135-22
W701-108-22
W564-37-22RED
P/O
187P13
P/O
187P27
P/O
187P31
P/O
187P30
P/O
187P10
UU
P/O RIGHT GUNNER C-6533/ARC (SEE NOTE 2)
P/O PILOT C-6533/ARC (SEE NOTE 2)
P/O AFT C-6533/ARC (SEE NOTE 2)
P/O TROOP COMMANDER C-6533/ARC (SEE NOTE 2)
P/O LEFT GUNNER C-6533/ARC (SEE NOTE 2)
P/O COPILOT C-6533/ARC
P/O
187P26
J1
T4
T3
HEADSET
AMPLIFIER
AR-2
UU
XX
TT
TO HEADSET
EL8PH016

NOTES:
1. ▭ INDICATES EQUIPMENT MARKINGS
2 SAME AS COPILOT'S C-6533/ARC

Figure FO-15. VHF navigation and instrument landing system facility (AN/ARN-123) audio circuit (VOR/LOC)


P/O RECEIVER
R-2023/ARN-123
MARKER BEACON AUDIO
4
P/O 192P10
W690-369-22BLU
P/O 300P13
35
W557-408-22BLU
P/O 192P1
19
P/O CONTROL
C-10048/ARN-123
MARKER BEACON AUDIO
18
P/O 192P1
NOTES:
1 ▭ INDICATES EQUIPMENT MARKINGS
2 SAME AS COPILOT'S C-6533/ARC
W557-859-22BLU
61
P/O 300P13
W690-365-22BLU
P/O 187P7
17
P/O INTERPHONE JUNCTION BOX
J4 20 P/O 187P4
J2 32 P/O 187P2
J6 20 P/O 187P6
J5 32 P/O 187P5
J3 20 P/O 187P3
J1 32 P/O 187P1
W701-62-22BLU
W564-81-22RED
W564-91-22 BLU
W701-26-22RED
TB30 A 4 B
TB29 G 5 H
TB31 A 4 B
W564-118-22RED
W701-123-22
W701-133-22
W701-106-22
W564-35-22RED
P/O 187P13
P/O 187P27
P/O 187P31
P/O 187P30
P/O 187P10
HH
P/O RIGHT GUNNER C-6533/ARC (SEE NOTE 2)
P/O PILOT C-6533/ARC (SEE NOTE 2)
P/O AFT C-6533/ARC (SEE NOTE 2)
P/O TROOP COMMANDER C-6533/ARC (SEE NOTE 2)
P/O LEFT GUNNER C-6533/ARC (SEE NOTE 2)
P/O COPILOT C-6533/ARC
P/O 187P26
J1
T4
T3
HEADSET AMPLIFIER AR-2
HH
XX
TT
TO HEADSET

EL8PH017

Figure FO-16. VHF navigation and instrument landing system facility (AN/ARN-123) audio circuit (marker beacon)

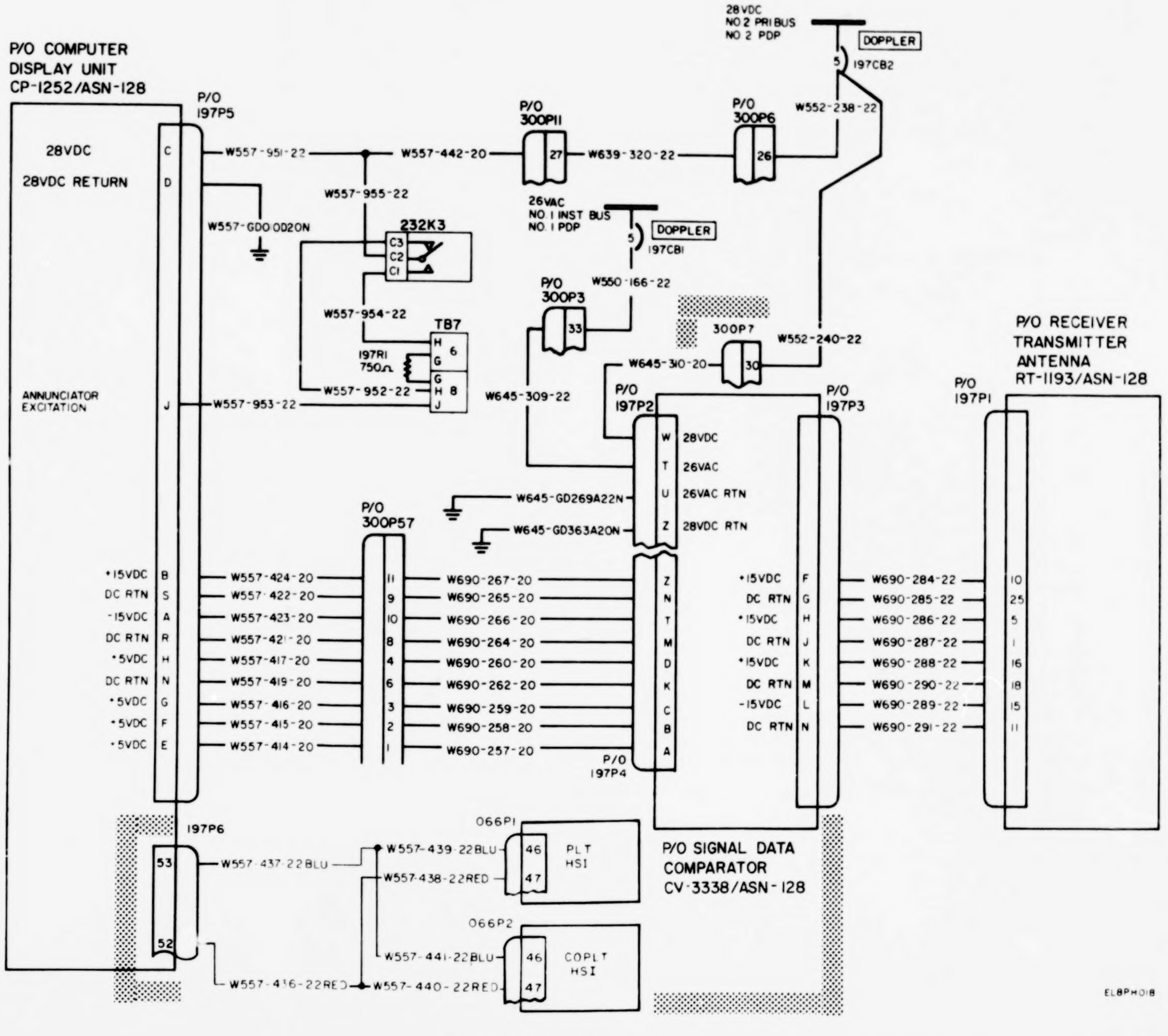
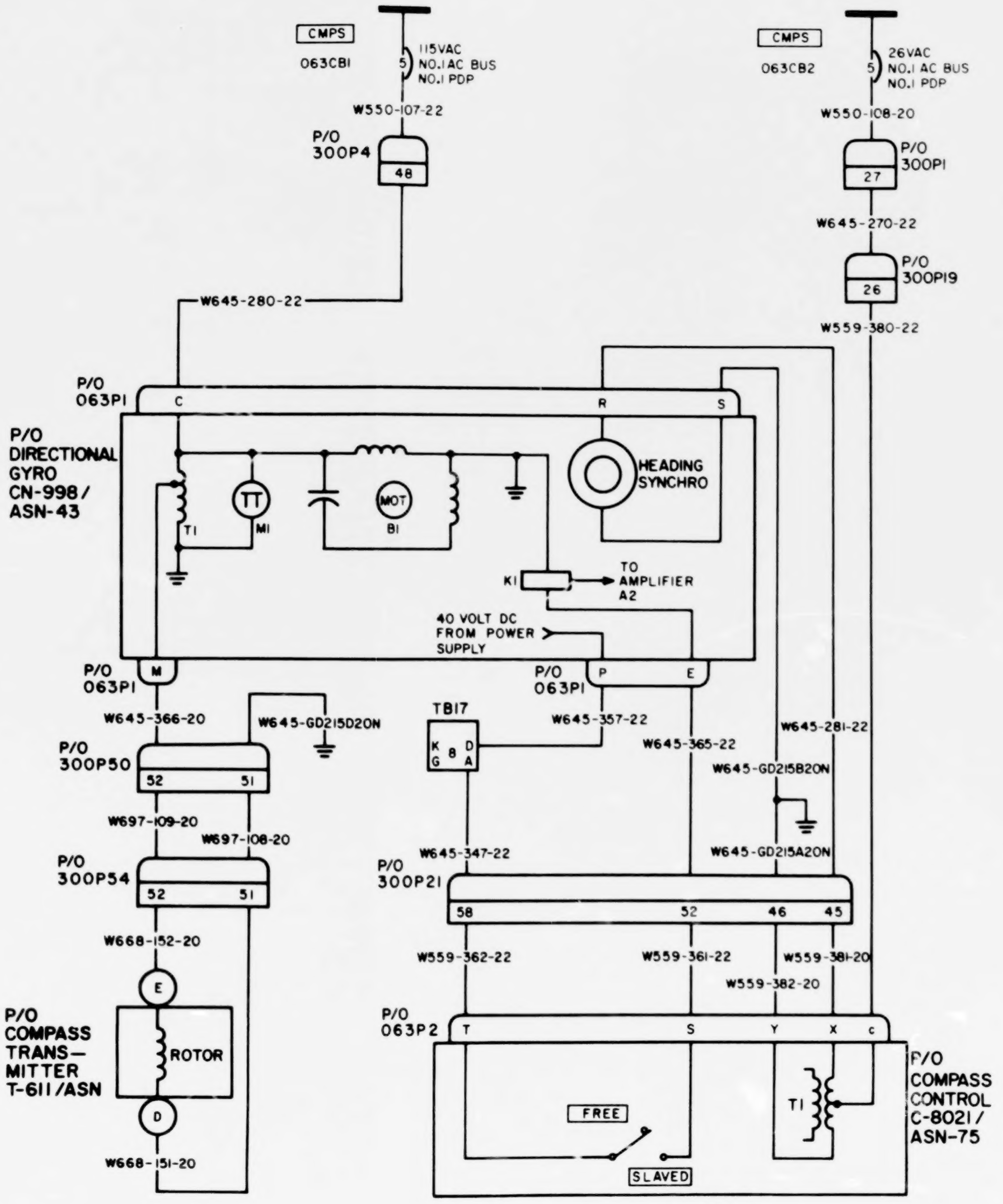

P/O COMPUTER DISPLAY UNIT CP-1252/ASN-128
P/O 197P5
28VDC
28VDC RETURN
ANNUNCIATOR EXCITATION
W557-951-22
W557-442-20
W557-955-22
W557-GD0-0020N
232K3
C3
C2
C1
W557-954-22
TB7
197R1 750Ω
W557-952-22
W557-953-22
P/O 300P11
W639-320-22
P/O 300P6
28VDC NO 2 PRI BUS NO 2 PDP
DOPPLER
197CB2
W552-238-22
26VAC NO.1 INST BUS NO.1 PDP
DOPPLER
197CB1
W550-166-22
P/O 300P3
300P7
W552-240-22
W645-310-20
W645-309-22
P/O 197P2
P/O 197P3
28VDC
26VAC
26VAC RTN
28VDC RTN
W645-GD269A22N
W645-GD363A20N
P/O 300P57
+15VDC
DC RTN
-15VDC
DC RTN
+5VDC
DC RTN
+5VDC
+5VDC
+5VDC
W557-424-20
W557-422-20
W557-423-20
W557-421-20
W557-417-20
W557-419-20
W557-416-20
W557-415-20
W557-414-20
W690-267-20
W690-265-20
W690-266-20
W690-264-20
W690-260-20
W690-262-20
W690-259-20
W690-258-20
W690-257-20
P/O 197P4
+15VDC
DC RTN
+15VDC
DC RTN
+15VDC
DC RTN
-15VDC
DC RTN
W690-284-22
W690-285-22
W690-286-22
W690-287-22
W690-288-22
W690-290-22
W690-289-22
W690-291-22
P/O 197P1
P/O RECEIVER TRANSMITTER ANTENNA RT-1193/ASN-128
197P6
W557-437-22BLU
W557-416-22RED
066P1
W557-439-22BLU
W557-438-22RED
PLT HSI
066P2
W557-441-22BLU
W557-440-22RED
COPLT HSI
P/O SIGNAL DATA COMPARATOR CV-3338/ASN-128
EL8PH018

Figure FO-17. Doppler navigation set facility (AN/ASN-128A) power and control circuits


CMPS
063CB1
5
115VAC
NO.1 AC BUS
NO.1 PDP
W550-107-22
P/O
300P4
48
CMPS
063CB2
5
26VAC
NO.1 AC BUS
NO.1 PDP
W550-108-20
P/O
300P1
27
W645-270-22
P/O
300P19
26
W559-380-22
W645-280-22
P/O
063P1
C
R
S
P/O
DIRECTIONAL
GYRO
CN-998/
ASN-43
T1
TT
M1
MOT
B1
HEADING
SYNCHRO
K1
TO
AMPLIFIER
A2
40 VOLT DC
FROM POWER
SUPPLY
P/O
063P1
M
P/O
063P1
P
E
W645-366-20
W645-GD215D20N
TB17
K
G
8
D
A
W645-357-22
W645-365-22
W645-281-22
W645-GD215B20N
P/O
300P50
52
51
W697-109-20
W697-108-20
P/O
300P54
52
51
W645-347-22
W645-GD215A20N
P/O
300P21
58
52
46
45
W668-152-20
W559-362-22
W559-361-22
W559-381-20
W559-382-20
E
P/O
COMPASS
TRANS-
MITTER
T-611/ASN
ROTOR
D
W668-151-20
P/O
063P2
T
S
Y
X
c
FREE
SLAVED
T1
P/O
COMPASS
CONTROL
C-8021/
ASN-75

EL8PH019

Figure FO-18. Directional gyro (AN/ASN-43) power and control circuits

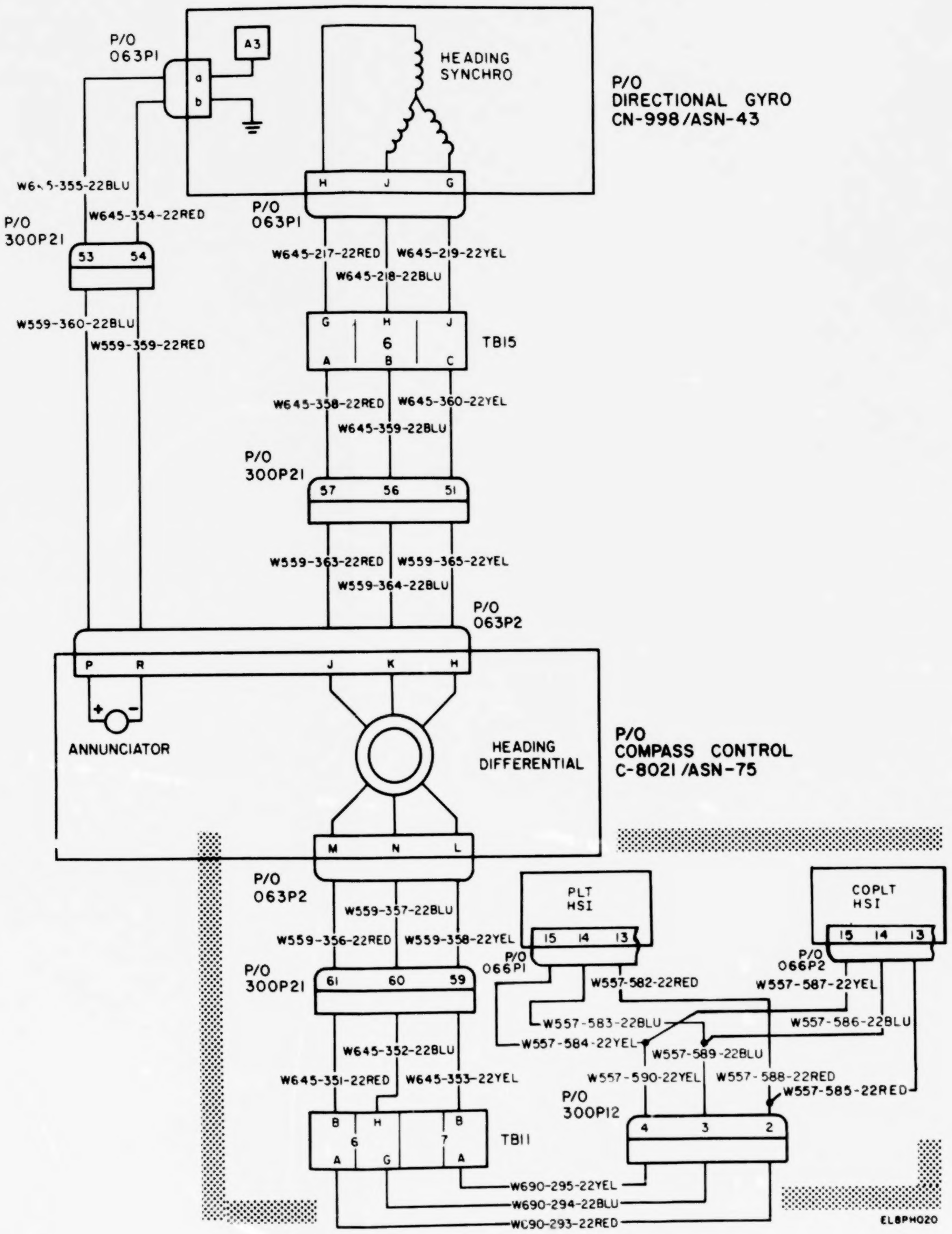
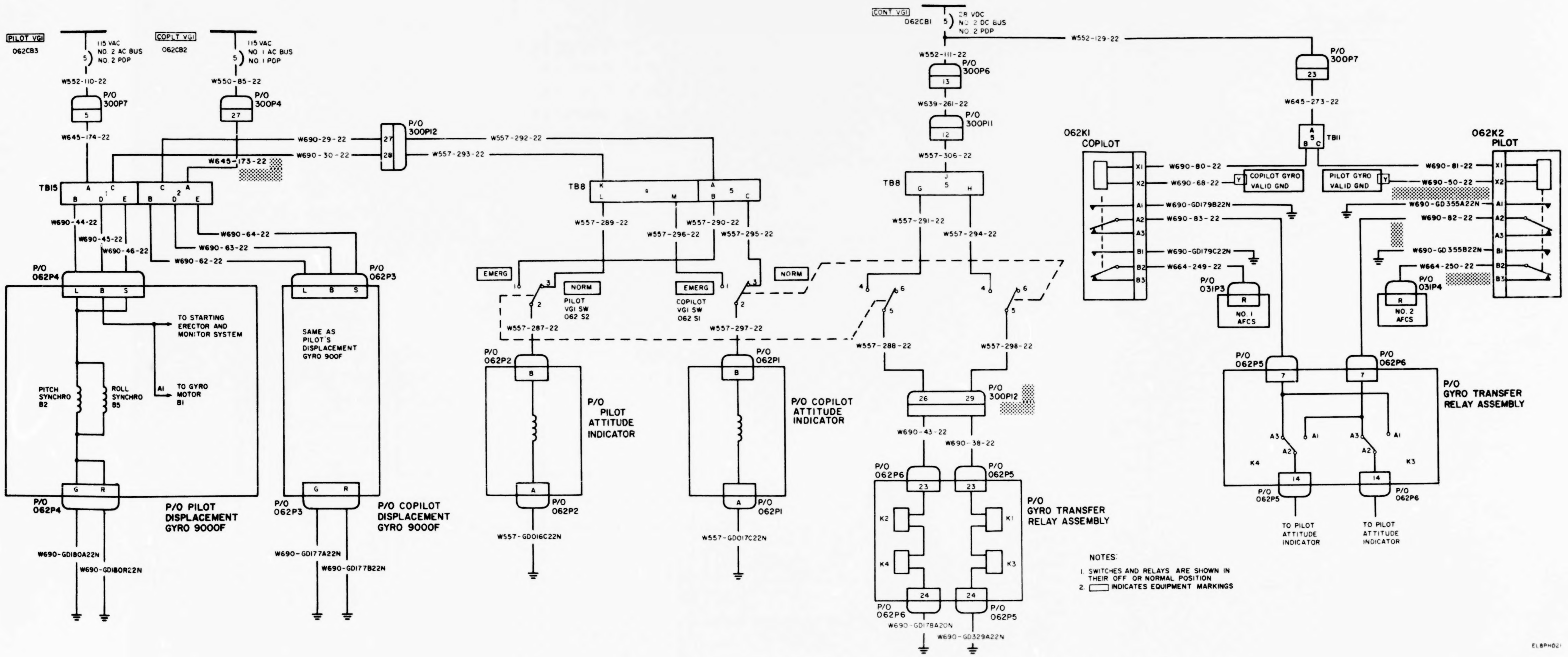

P/O
063P1
A3
a
b
HEADING
SYNCHRO
P/O
DIRECTIONAL GYRO
CN-998/ASN-43
H
J
G
P/O
063P1
W645-355-22BLU
W645-354-22RED
P/O
300P21
53
54
W559-360-22BLU
W559-359-22RED
W645-217-22RED
W645-219-22YEL
W645-218-22BLU
G
H
J
6
A
B
C
TB15
W645-358-22RED
W645-360-22YEL
W645-359-22BLU
P/O
300P21
57
56
51
W559-363-22RED
W559-365-22YEL
W559-364-22BLU
P/O
063P2
P
R
J
K
H
+
-
ANNUNCIATOR
HEADING
DIFFERENTIAL
P/O
COMPASS CONTROL
C-8021/ASN-75
M
N
L
P/O
063P2
W559-357-22BLU
W559-356-22RED
W559-358-22YEL
P/O
300P21
61
60
59
W645-352-22BLU
W645-351-22RED
W645-353-22YEL
B
H
B
6
7
A
G
A
TB11
PLT
HSI
15
14
13
P/O
066P1
COPLT
HSI
15
14
13
P/O
066P2
W557-582-22RED
W557-587-22YEL
W557-583-22BLU
W557-586-22BLU
W557-584-22YEL
W557-589-22BLU
W557-590-22YEL
W557-588-22RED
W557-585-22RED
P/O
300P12
4
3
2
W690-295-22YEL
W690-294-22BLU
W690-293-22RED
EL8PH020

Figure FO-19. Directional gyro (AN/ASN-43) indicating circuits


PILOT VGI
062CB3
115 VAC
NO. 2 AC BUS
NO. 2 PDP
5
W552-110-22
P/O
300P7
5
W645-174-22
COPLT VGI
062CB2
115 VAC
NO. 1 AC BUS
NO. 1 PDP
5
W550-85-22
P/O
300P4
27
W645-173-22
W690-29-22
W690-30-22
P/O
300P12
27
28
W557-292-22
W557-293-22
TB15
A
C
B
D
E
1
2
W690-44-22
W690-45-22
W690-46-22
W690-64-22
W690-63-22
W690-62-22
P/O
062P4
L
B
S
TO STARTING
ERECTOR AND
MONITOR SYSTEM
PITCH
SYNCHRO
B2
ROLL
SYNCHRO
B5
A1
TO GYRO
MOTOR
B1
G
R
P/O
062P4
P/O PILOT
DISPLACEMENT
GYRO 9000F
W690-GD180A22N
W690-GD180R22N
P/O
062P3
SAME AS
PILOT'S
DISPLACEMENT
GYRO 900F
P/O
062P3
P/O COPILOT
DISPLACEMENT
GYRO 9000F
W690-GD177A22N
W690-GD177B22N
TB8
K
L
4
M
A
B
5
C
W557-289-22
W557-296-22
W557-290-22
W557-295-22
EMERG
NORM
PILOT
VGI SW
062 S2
EMERG
NORM
COPILOT
VGI SW
062 S1
1
2
3
W557-287-22
W557-297-22
P/O
062P2
B
P/O
PILOT
ATTITUDE
INDICATOR
A
P/O
062P2
W557-GD016C22N
P/O
062P1
B
P/O COPILOT
ATTITUDE
INDICATOR
A
P/O
062P1
W557-GD017C22N
CONT VGI
062CB1
28 VDC
NO. 2 DC BUS
NO. 2 PDP
5
W552-129-22
W552-111-22
P/O
300P6
13
W539-261-22
P/O
300P11
12
W557-306-22
TB8
J
5
G
H
W557-291-22
W557-294-22
4
5
6
W557-288-22
W557-298-22
P/O
300P12
26
29
W690-43-22
W690-38-22
P/O
062P6
P/O
062P5
23
K2
K4
K1
K3
24
P/O
GYRO TRANSFER
RELAY ASSEMBLY
P/O
062P6
P/O
062P5
W690-GD178A20N
W690-GD329A22N
P/O
300P7
23
W645-273-22
A
5
B
C
TB11
062K1
COPILOT
X1
X2
A1
A2
A3
B1
B2
B3
W690-80-22
W690-68-22
Y
COPILOT GYRO
VALID GND
W690-GD179B22N
W690-83-22
W690-GD179C22N
W664-249-22
P/O
031P3
R
NO. 1
AFCS
062K2
PILOT
PILOT GYRO
VALID GND
W690-81-22
W690-50-22
W690-GD355A22N
W690-82-22
W690-GD355B22N
W664-250-22
P/O
031P4
R
NO. 2
AFCS
P/O
062P5
7
P/O
062P6
P/O
GYRO TRANSFER
RELAY ASSEMBLY
A3
A1
A2
K4
K3
14
P/O
062P5
P/O
062P6
TO PILOT
ATTITUDE
INDICATOR
TO PILOT
ATTITUDE
INDICATOR
EL8PH021

NOTES:

1. SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
2. ☐ INDICATES EQUIPMENT MARKINGS

Figure FO-20. VGI facility power and control circuits

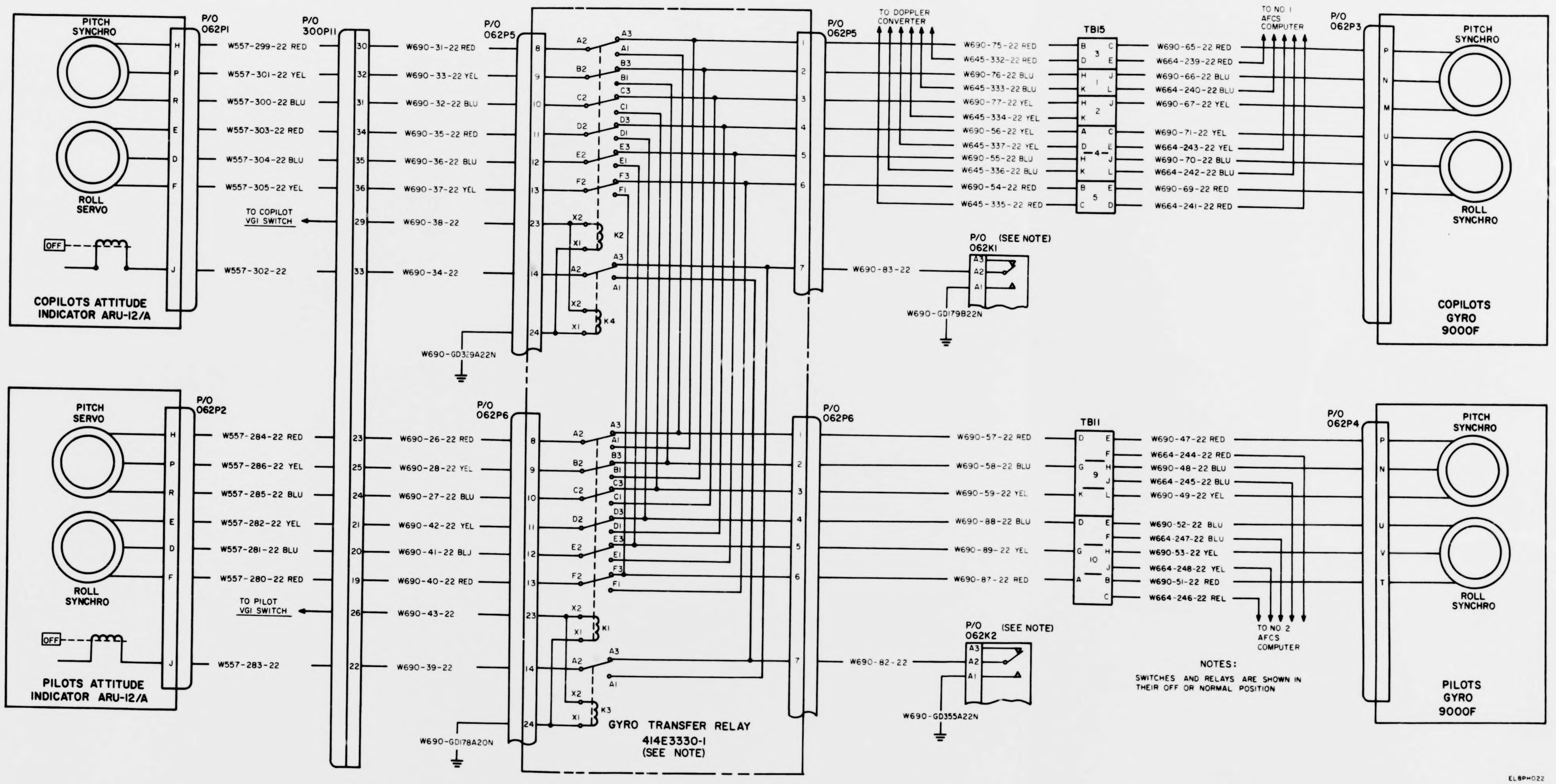

PITCH SYNCHRO
ROLL SERVO
OFF
COPILOTS ATTITUDE INDICATOR ARU-12/A
P/O 062P1
H
P
R
E
D
F
J
W557-299-22 RED
W557-301-22 YEL
W557-300-22 BLU
W557-303-22 RED
W557-304-22 BLU
W557-305-22 YEL
TO COPILOT VGI SWITCH
W557-302-22
P/O 300P11
30
32
31
34
35
36
29
33
W690-31-22 RED
W690-33-22 YEL
W690-32-22 BLU
W690-35-22 RED
W690-36-22 BLU
W690-37-22 YEL
W690-38-22
W690-34-22
P/O 062P5
8
9
10
11
12
13
23
14
24
W690-GD329A22N
A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
E1
E2
E3
F1
F2
F3
X1
X2
K1
K2
K3
K4
PITCH SERVO
ROLL SYNCHRO
PILOTS ATTITUDE INDICATOR ARU-12/A
P/O 062P2
W557-284-22 RED
W557-286-22 YEL
W557-285-22 BLU
W557-282-22 YEL
W557-281-22 BLU
W557-280-22 RED
TO PILOT VGI SWITCH
W557-283-22
23
25
24
21
20
19
26
22
W690-26-22 RED
W690-28-22 YEL
W690-27-22 BLU
W690-42-22 YEL
W690-41-22 BLJ
W690-40-22 RED
W690-43-22
W690-39-22
P/O 062P6
W690-GD178A20N
GYRO TRANSFER RELAY 414E3330-1 (SEE NOTE)
1
2
3
4
5
6
7
TO DOPPLER CONVERTER
W690-75-22 RED
W645-332-22 RED
W690-76-22 BLU
W645-333-22 BLU
W690-77-22 YEL
W645-334-22 YEL
W690-56-22 YEL
W645-337-22 YEL
W690-55-22 BLU
W645-336-22 BLU
W690-54-22 RED
W645-335-22 RED
TB15
W690-65-22 RED
W664-239-22 RED
W690-66-22 BLU
W664-240-22 BLU
W690-67-22 YEL
W690-71-22 YEL
W664-243-22 YEL
W690-70-22 BLU
W664-242-22 BLU
W690-69-22 RED
W664-241-22 RED
TO NO 1 AFCS COMPUTER
P/O 062P3
P
N
M
U
V
T
PITCH SYNCHRO
ROLL SYNCHRO
COPILOTS GYRO 9000F
W690-83-22
P/O 062K1 (SEE NOTE)
W690-GD179B22N
W690-57-22 RED
W690-58-22 BLU
W690-59-22 YEL
W690-88-22 BLU
W690-89-22 YEL
W690-87-22 RED
TB11
9
10
W690-47-22 RED
W664-244-22 RED
W690-48-22 BLU
W664-245-22 BLU
W690-49-22 YEL
W690-52-22 BLU
W664-247-22 BLU
W690-53-22 YEL
W664-248-22 YEL
W690-51-22 RED
W664-246-22 REL
TO NO. 2 AFCS COMPUTER
P/O 062P4
PILOTS GYRO 9000F
W690-82-22
P/O 062K2 (SEE NOTE)
W690-GD355A22N
NOTES:
SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
EL8PH022

Figure FO-21. VGI indicating circuits

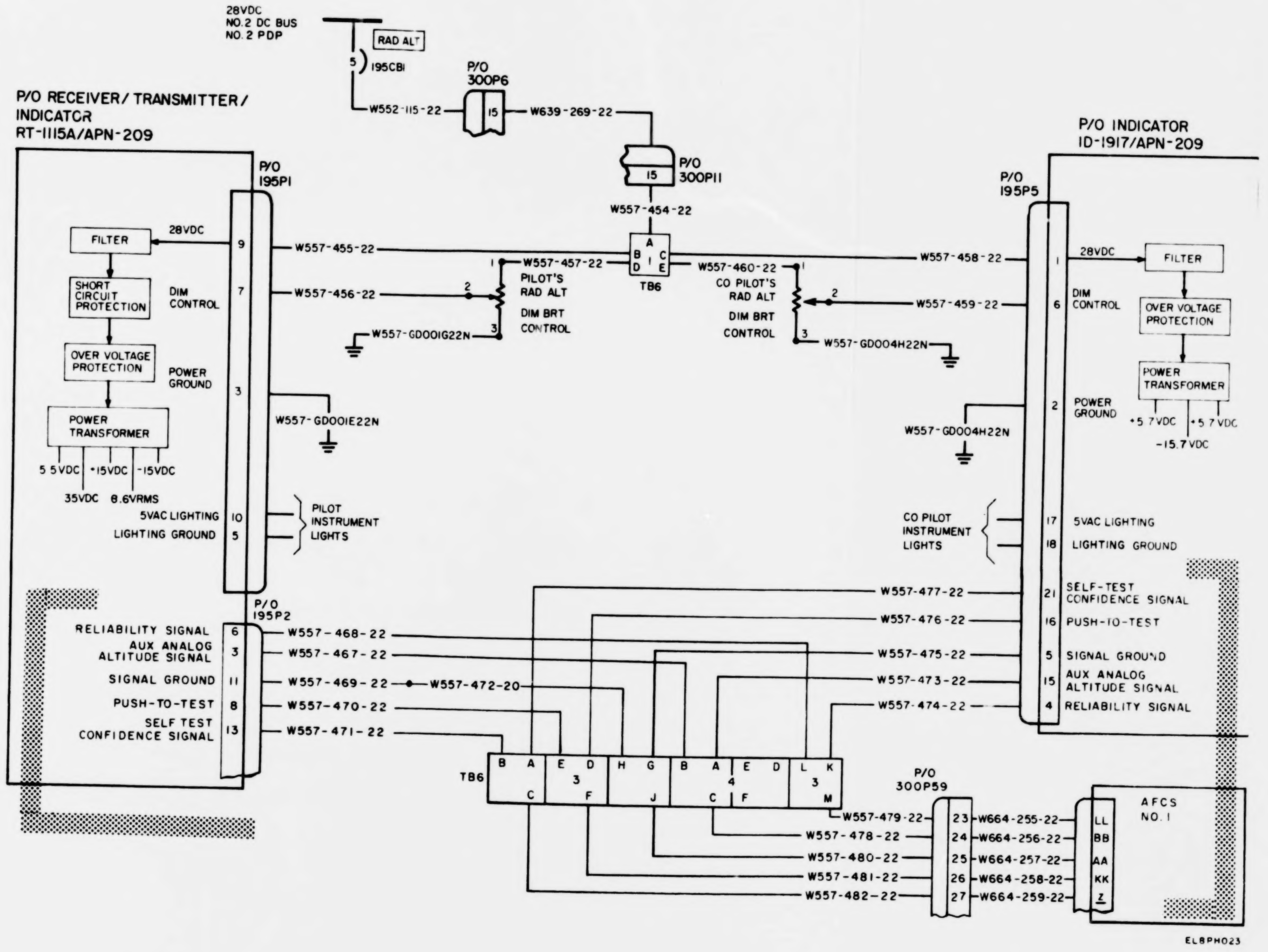

28VDC
NO.2 DC BUS
NO.2 PDP
RAD ALT
5
195CBI
P/O
300P6
W552-115-22
15
W639-269-22
P/O RECEIVER/ TRANSMITTER/
INDICATOR
RT-1115A/APN-209
P/O
195P1
15
P/O
300P11
W557-454-22
28VDC
FILTER
9
W557-455-22
A
B
C
D
E
TB6
1
W557-457-22
PILOT'S
RAD ALT
DIM BRT
CONTROL
2
3
W557-460-22
CO PILOT'S
RAD ALT
DIM BRT
CONTROL
W557-458-22
SHORT
CIRCUIT
PROTECTION
DIM
CONTROL
7
W557-456-22
W557-GD001G22N
W557-459-22
W557-GD004H22N
OVER VOLTAGE
PROTECTION
POWER
GROUND
3
W557-GD001E22N
POWER
TRANSFORMER
5 5VDC
+15VDC
-15VDC
35VDC
8.6VRMS
5VAC LIGHTING
10
LIGHTING GROUND
5
PILOT
INSTRUMENT
LIGHTS
P/O INDICATOR
ID-1917/APN-209
P/O
195P5
1
28VDC
FILTER
6
DIM
CONTROL
OVER VOLTAGE
PROTECTION
2
POWER
GROUND
W557-GD004H22N
POWER
TRANSFORMER
+5 7VDC
+5 7VDC
-15.7VDC
CO PILOT
INSTRUMENT
LIGHTS
17
5VAC LIGHTING
18
LIGHTING GROUND
P/O
195P2
RELIABILITY SIGNAL
6
W557-468-22
AUX ANALOG
ALTITUDE SIGNAL
3
W557-467-22
SIGNAL GROUND
11
W557-469-22
W557-472-20
PUSH-TO-TEST
8
W557-470-22
SELF TEST
CONFIDENCE SIGNAL
13
W557-471-22
W557-477-22
21
SELF-TEST
CONFIDENCE SIGNAL
W557-476-22
16
PUSH-TO-TEST
W557-475-22
5
SIGNAL GROUND
W557-473-22
15
AUX ANALOG
ALTITUDE SIGNAL
W557-474-22
4
RELIABILITY SIGNAL
TB6
B
A
C
E
D
3
F
H
G
J
B
A
4
C
E
D
F
L
K
3
M
P/O
300P59
W557-479-22
23
W664-255-22
LL
W557-478-22
24
W664-256-22
BB
W557-480-22
25
W664-257-22
AA
W557-481-22
26
W664-258-22
KK
W557-482-22
27
W664-259-22
Z
AFCS
NO. 1
EL8PH023

Figure FO-22. Radar altimeter (AN/APN-209) power and control circuits

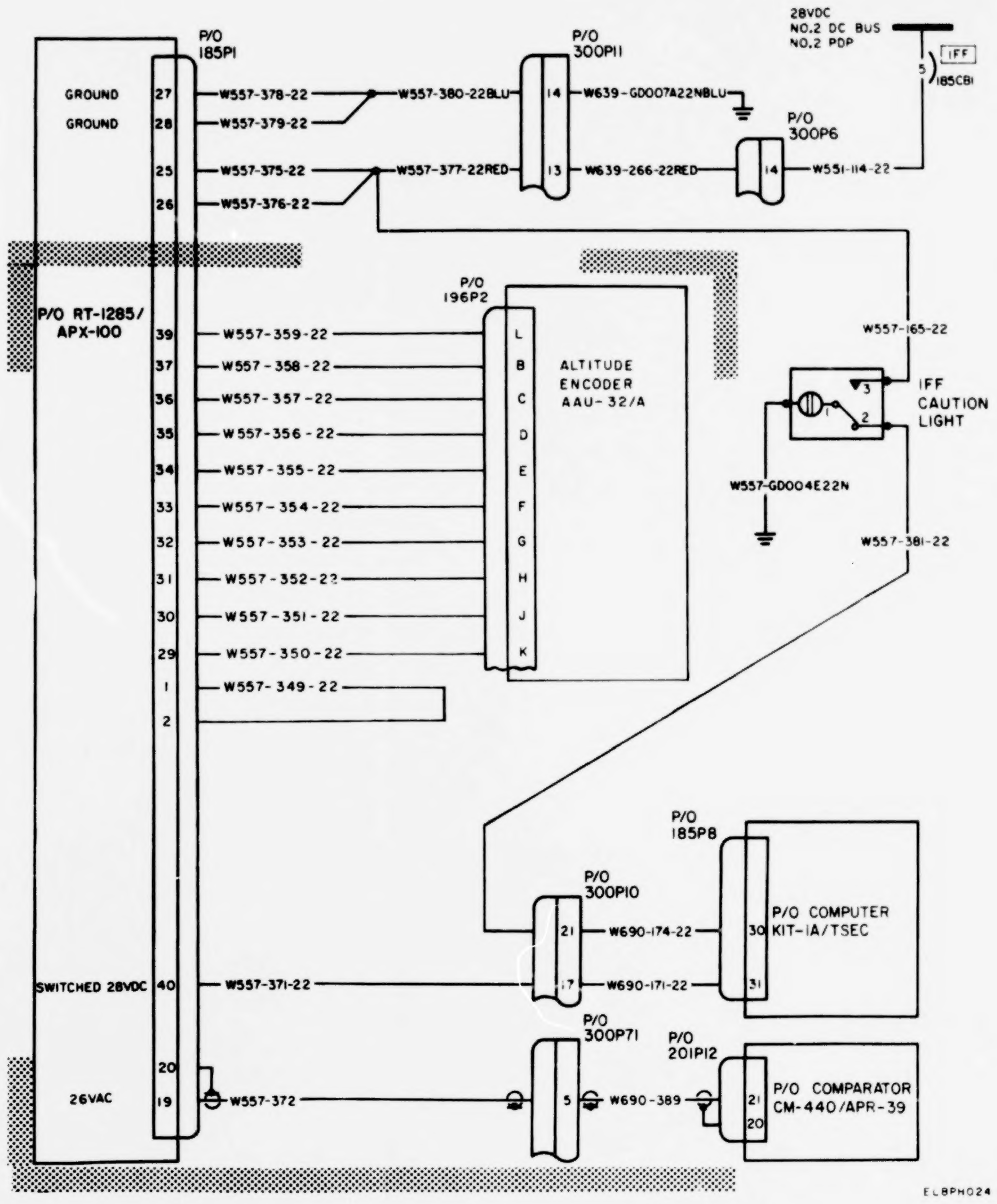
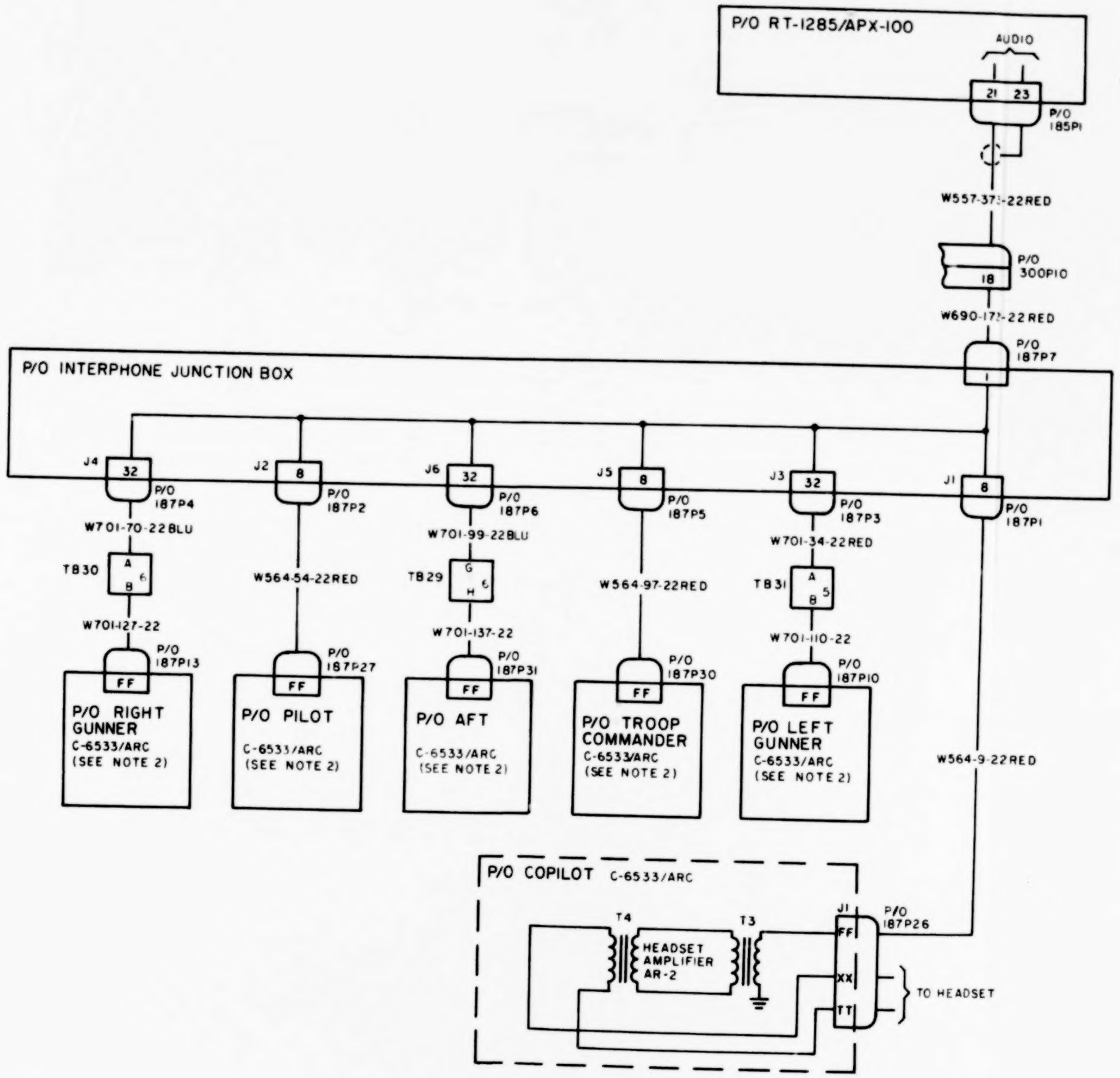

28VDC
NO.2 DC BUS
NO.2 PDP
IFF
5
185CB1
P/O
185P1
GROUND
GROUND
27
28
25
26
W557-378-22
W557-379-22
W557-375-22
W557-376-22
W557-380-22BLU
W557-377-22RED
P/O
300P11
14
13
W639-GD007A22NBLU
W639-266-22RED
P/O
300P6
14
W551-114-22
P/O RT-1285/
APX-100
P/O
196P2
39
37
36
35
34
33
32
31
30
29
1
2
W557-359-22
W557-358-22
W557-357-22
W557-356-22
W557-355-22
W557-354-22
W557-353-22
W557-352-22
W557-351-22
W557-350-22
W557-349-22
L
B
C
D
E
F
G
H
J
K
ALTITUDE
ENCODER
AAU-32/A
W557-165-22
3
1
2
IFF
CAUTION
LIGHT
W557-GD004E22N
W557-381-22
P/O
185P8
P/O
300P10
21
17
W690-174-22
W690-171-22
30
31
P/O COMPUTER
KIT-1A/TSEC
SWITCHED 28VDC
40
W557-371-22
P/O
300P71
P/O
201P12
20
19
26VAC
W557-372
5
W690-389
21
20
P/O COMPARATOR
CM-440/APR-39
EL8PH024

Figure FO-23. Transponder set (AN/APX-100) power and control circuits

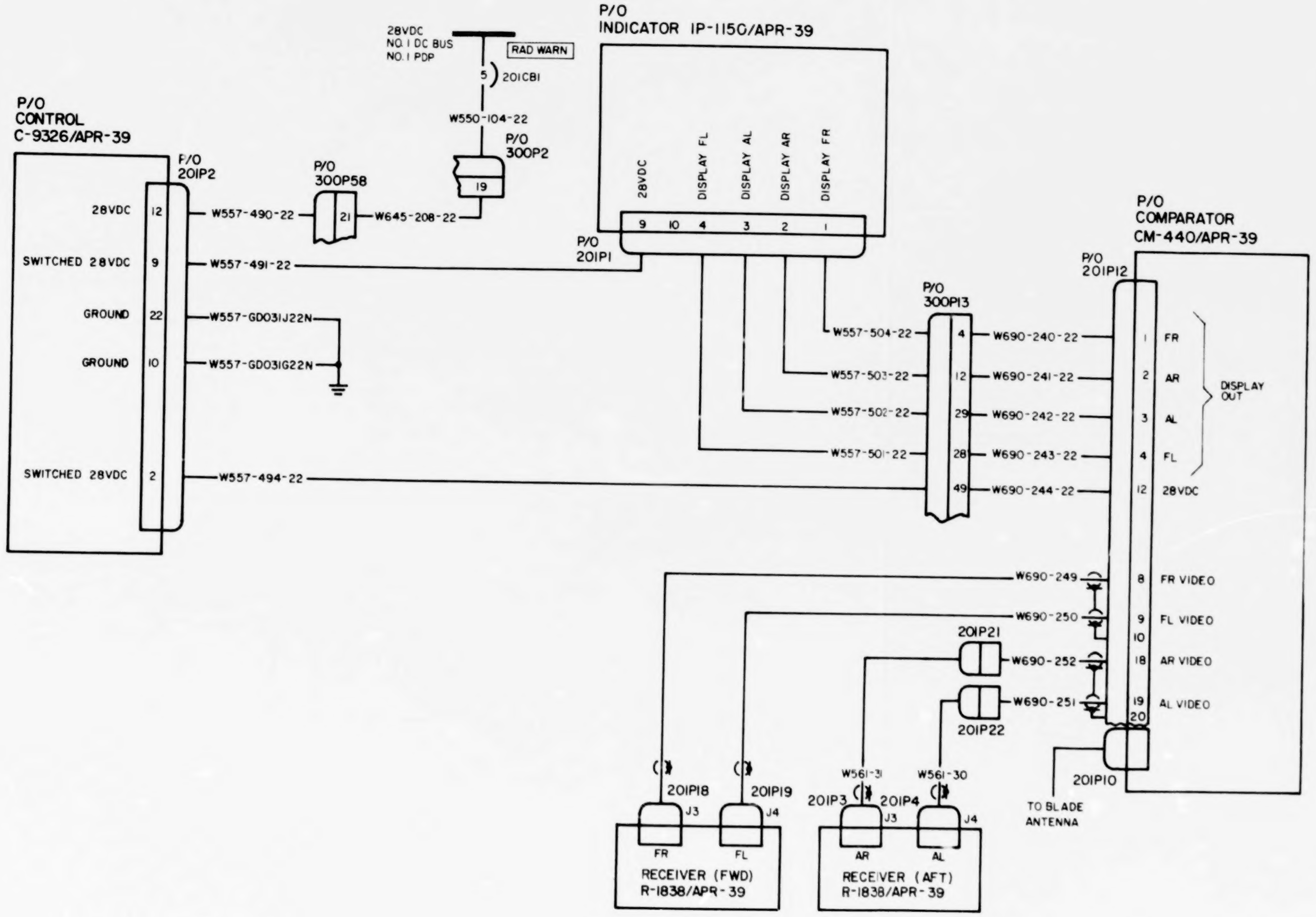

P/O RT-1285/APX-100
AUDIO
21
23
P/O
185P1
W557-371-22RED
18
P/O
300P10
W690-171-22RED
P/O
187P7
1
P/O INTERPHONE JUNCTION BOX
J4
32
P/O
187P4
J2
8
P/O
187P2
J6
32
P/O
187P6
J5
8
P/O
187P5
J3
32
P/O
187P3
J1
8
P/O
187P1
W701-70-22BLU
TB30
A
B
6
W701-127-22
W564-54-22RED
W701-99-22BLU
TB29
G
H
6
W701-137-22
W564-97-22RED
W701-34-22RED
TB31
A
B
5
W701-110-22
P/O
187P13
FF
P/O RIGHT GUNNER
C-6533/ARC
(SEE NOTE 2)
P/O
187P27
FF
P/O PILOT
C-6533/ARC
(SEE NOTE 2)
P/O
187P31
FF
P/O AFT
C-6533/ARC
(SEE NOTE 2)
P/O
187P30
FF
P/O TROOP COMMANDER
C-6533/ARC
(SEE NOTE 2)
P/O
187P10
FF
P/O LEFT GUNNER
C-6533/ARC
(SEE NOTE 2)
W564-9-22RED
P/O COPILOT C-6533/ARC
T4
HEADSET AMPLIFIER AR-2
T3
J1
FF
XX
TT
P/O
187P26
TO HEADSET

NOTES:

1. ▭ INDICATES EQUIPMENT MARKINGS.
2. SAME AS COPILOT'S C-6533/ARC

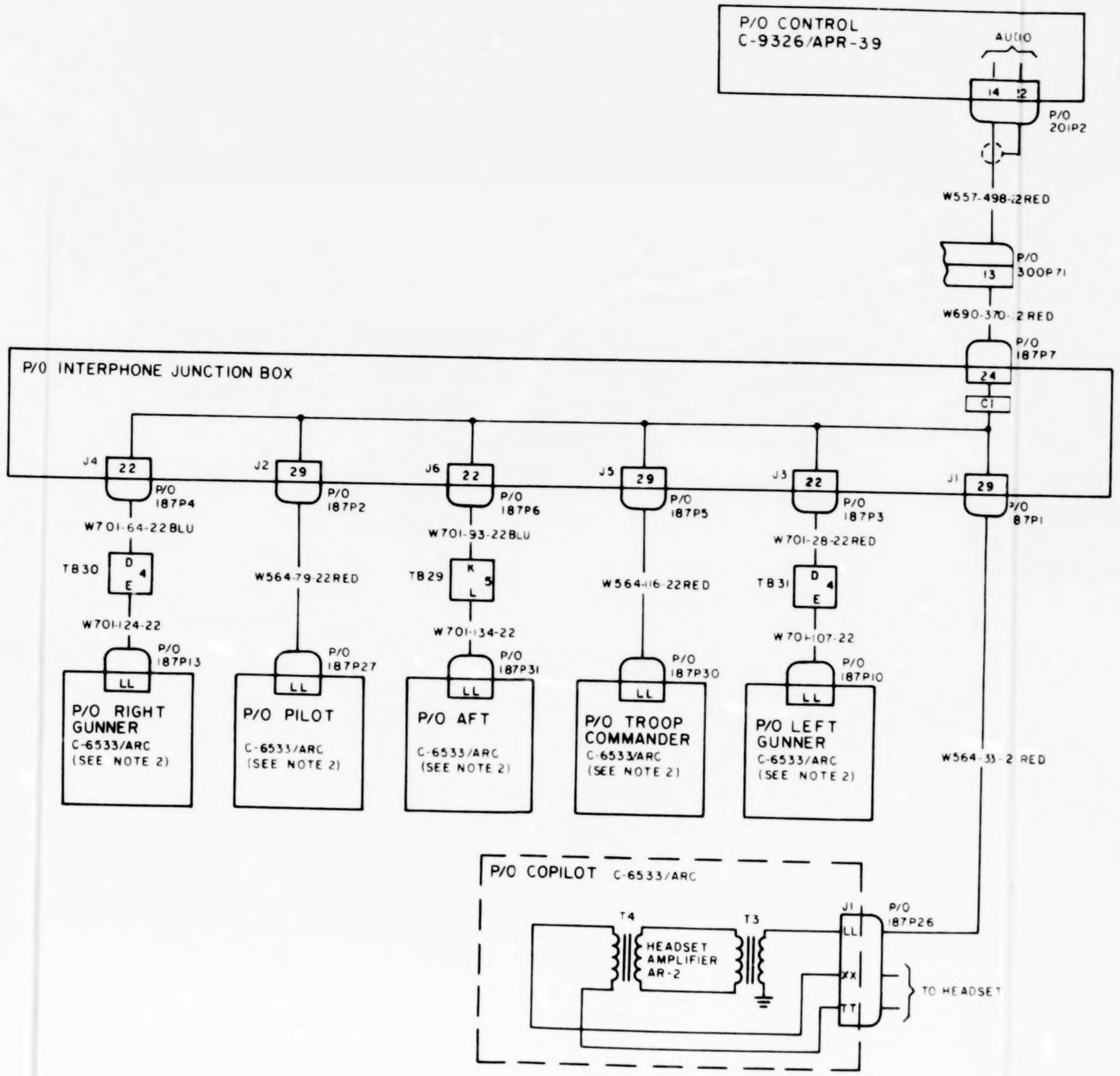
ELBPH025

Figure FO-24. Transponder set (AN/APX-100) audio circuits


28VDC
NO. 1 DC BUS
NO. 1 PDP
RAD WARN
5
201CB1
W550-104-22
P/O
300P2
19
P/O
INDICATOR IP-1150/APR-39
28VDC
DISPLAY FL
DISPLAY AL
DISPLAY AR
DISPLAY FR
9
10
4
3
2
1
P/O
201P1
P/O
CONTROL
C-9326/APR-39
P/O
201P2
28VDC
12
SWITCHED 28VDC
9
GROUND
22
GROUND
10
SWITCHED 28VDC
2
W557-490-22
P/O
300P58
21
W645-208-22
W557-491-22
W557-GD031J22N
W557-GD031G22N
W557-494-22
W557-504-22
W557-503-22
W557-502-22
W557-501-22
P/O
300P13
4
12
29
28
49
W690-240-22
W690-241-22
W690-242-22
W690-243-22
W690-244-22
P/O
COMPARATOR
CM-440/APR-39
P/O
201P12
1
FR
2
AR
3
AL
4
FL
DISPLAY OUT
12
28VDC
W690-249
8
FR VIDEO
W690-250
9
FL VIDEO
10
201P21
W690-252
18
AR VIDEO
W690-251
19
AL VIDEO
20
201P22
201P10
TO BLADE ANTENNA
W561-31
W561-30
201P18
J3
201P19
J4
201P3
201P4
J3
J4
FR
FL
RECEIVER (FWD)
R-1838/APR-39
AR
AL
RECEIVER (AFT)
R-1838/APR-39

EL8PH026

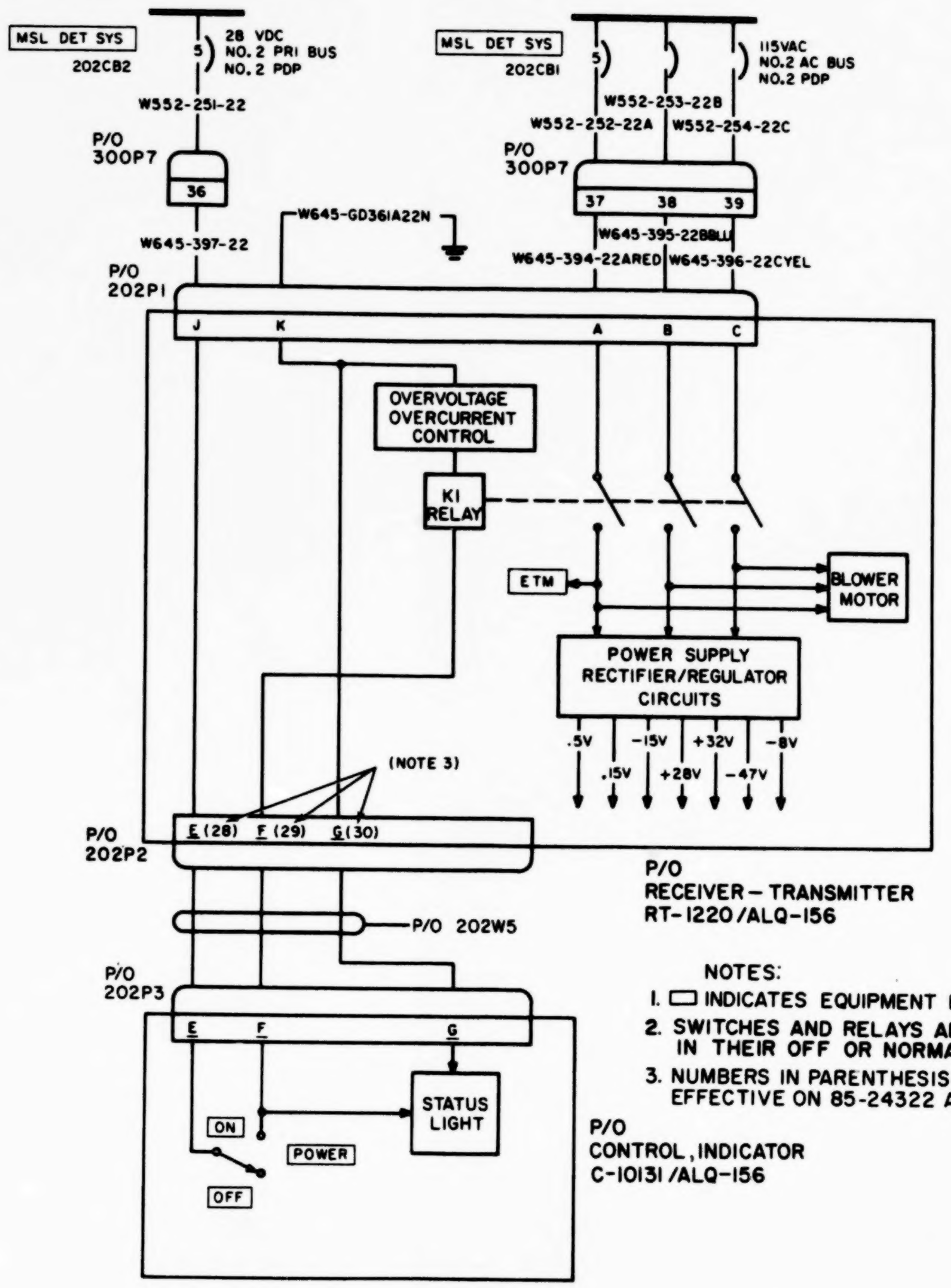
Figure FO-25. Detecting set, radar signal (AN/APR-39) power and control circuits


P/O CONTROL
C-9326/APR-39
AUDIO
14
12
P/O
201P2
W557-498-22RED
P/O
300P71
13
W690-370-22RED
P/O
187P7
24
C1
P/O INTERPHONE JUNCTION BOX
J4
22
P/O
187P4
W701-64-22BLU
TB30
D
4
E
W701-124-22
P/O
187P13
LL
P/O RIGHT GUNNER
C-6533/ARC
(SEE NOTE 2)
J2
29
P/O
187P2
W564-79-22RED
P/O
187P27
LL
P/O PILOT
C-6533/ARC
(SEE NOTE 2)
J6
22
P/O
187P6
W701-93-22BLU
TB29
K
5
L
W701-134-22
P/O
187P31
LL
P/O AFT
C-6533/ARC
(SEE NOTE 2)
J5
29
P/O
187P5
W564-116-22RED
P/O
187P30
LL
P/O TROOP COMMANDER
C-6533/ARC
(SEE NOTE 2)
J3
22
P/O
187P3
W701-28-22RED
TB31
D
4
E
W701-107-22
P/O
187P10
LL
P/O LEFT GUNNER
C-6533/ARC
(SEE NOTE 2)
J1
29
P/O
187P1
W564-33-2 RED
P/O COPILOT C-6533/ARC
T4
HEADSET AMPLIFIER AR-2
T3
J1
P/O
187P26
LL
XX
TT
TO HEADSET

NOTES:
1. ▭ INDICATES EQUIPMENT MARKINGS.
2. SAME AS COPILOT'S C-6533/ARC

EL8PH027

Figure FO-26. Detecting set, adar signal (AN/APR-39) audio circuits

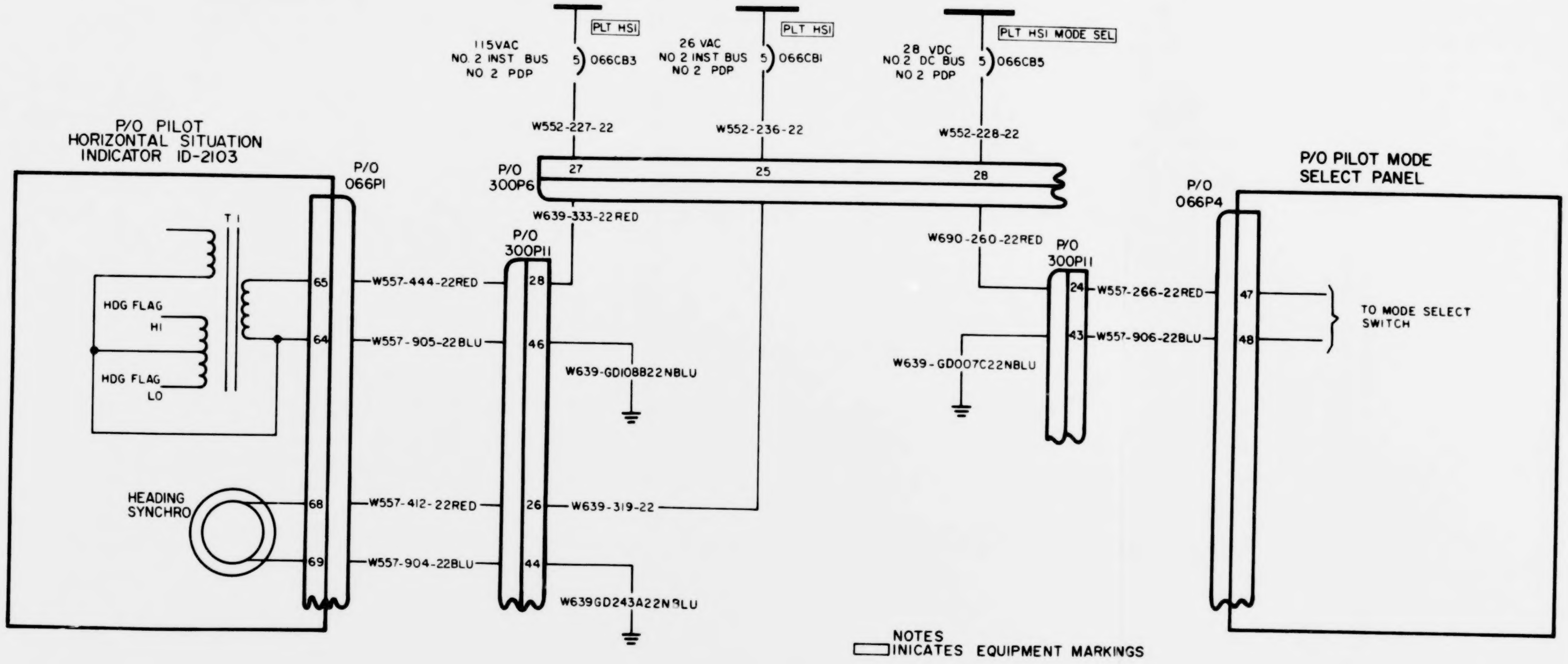

MSL DET SYS
202CB2
5
28 VDC
NO. 2 PRI BUS
NO. 2 PDP
W552-251-22
P/O
300P7
36
W645-GD361A22N
W645-397-22
MSL DET SYS
202CB1
5
115VAC
NO.2 AC BUS
NO.2 PDP
W552-253-22B
W552-252-22A
W552-254-22C
P/O
300P7
37
38
39
W645-395-22BBLU
W645-394-22ARED
W645-396-22CYEL
P/O
202P1
J
K
A
B
C
OVERVOLTAGE
OVERCURRENT
CONTROL
K1
RELAY
ETM
BLOWER
MOTOR
POWER SUPPLY
RECTIFIER/REGULATOR
CIRCUITS
.5V
.15V
-15V
+28V
+32V
-47V
-8V
(NOTE 3)
P/O
202P2
E (28)
F (29)
G (30)
P/O
RECEIVER – TRANSMITTER
RT-1220/ALQ-156
P/O 202W5
P/O
202P3
E
F
G
STATUS
LIGHT
ON
POWER
OFF
P/O
CONTROL, INDICATOR
C-10131/ALQ-156

NOTES:

1. ▭ INDICATES EQUIPMENT MARKINGS
2. SWITCHES AND RELAYS ARE SHOWN IN THEIR OFF OR NORMAL POSITION
3. NUMBERS IN PARENTHESIS ARE EFFECTIVE ON 85-24322 AND SUBQ

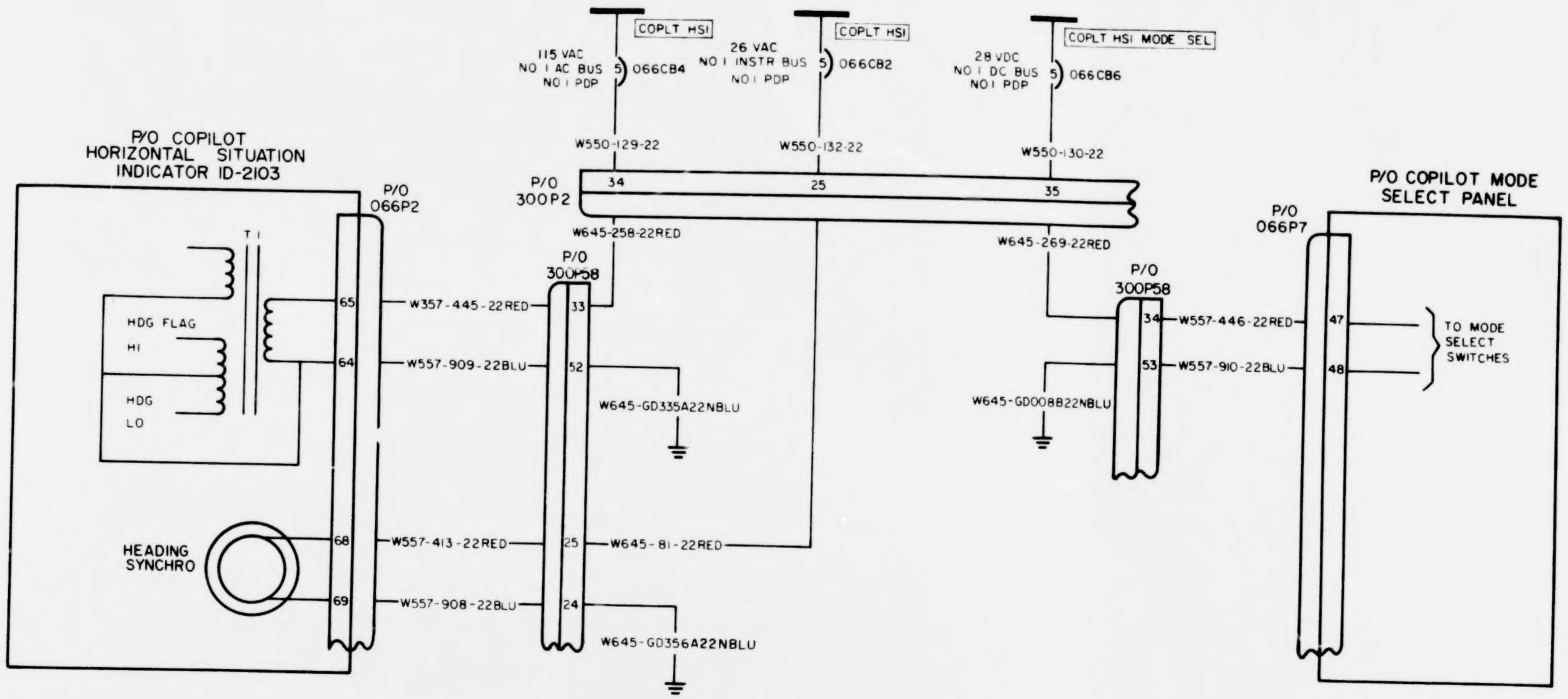
9878
EL8PH28

Figure FO-27. Countermeasures set facility (AN/ALQ-156) power and control circuits


P/O PILOT
HORIZONTAL SITUATION
INDICATOR ID-2103
T1
HDG FLAG
HI
HDG FLAG
LO
HEADING
SYNCHRO
P/O
066P1
65
64
68
69
W557-444-22RED
W557-905-22BLU
W557-412-22RED
W557-904-22BLU
P/O
300P11
28
46
26
44
W639-GD108B22NBLU
W639-319-22
W639GD243A22NBLU
115VAC
NO. 2 INST BUS
NO 2 PDP
5
066CB3
PLT HSI
26 VAC
NO 2 INST BUS
NO 2 PDP
5
066CB1
PLT HSI
28 VDC
NO 2 DC BUS
NO 2 PDP
5
066CB5
PLT HSI MODE SEL
W552-227-22
W552-236-22
W552-228-22
P/O
300P6
27
25
28
W639-333-22RED
W690-260-22RED
P/O
300P11
24
43
W557-266-22RED
W557-906-22BLU
W639-GD007C22NBLU
P/O
066P4
P/O PILOT MODE
SELECT PANEL
47
48
TO MODE SELECT
SWITCH
NOTES
INICATES EQUIPMENT MARKINGS

ELBPH029

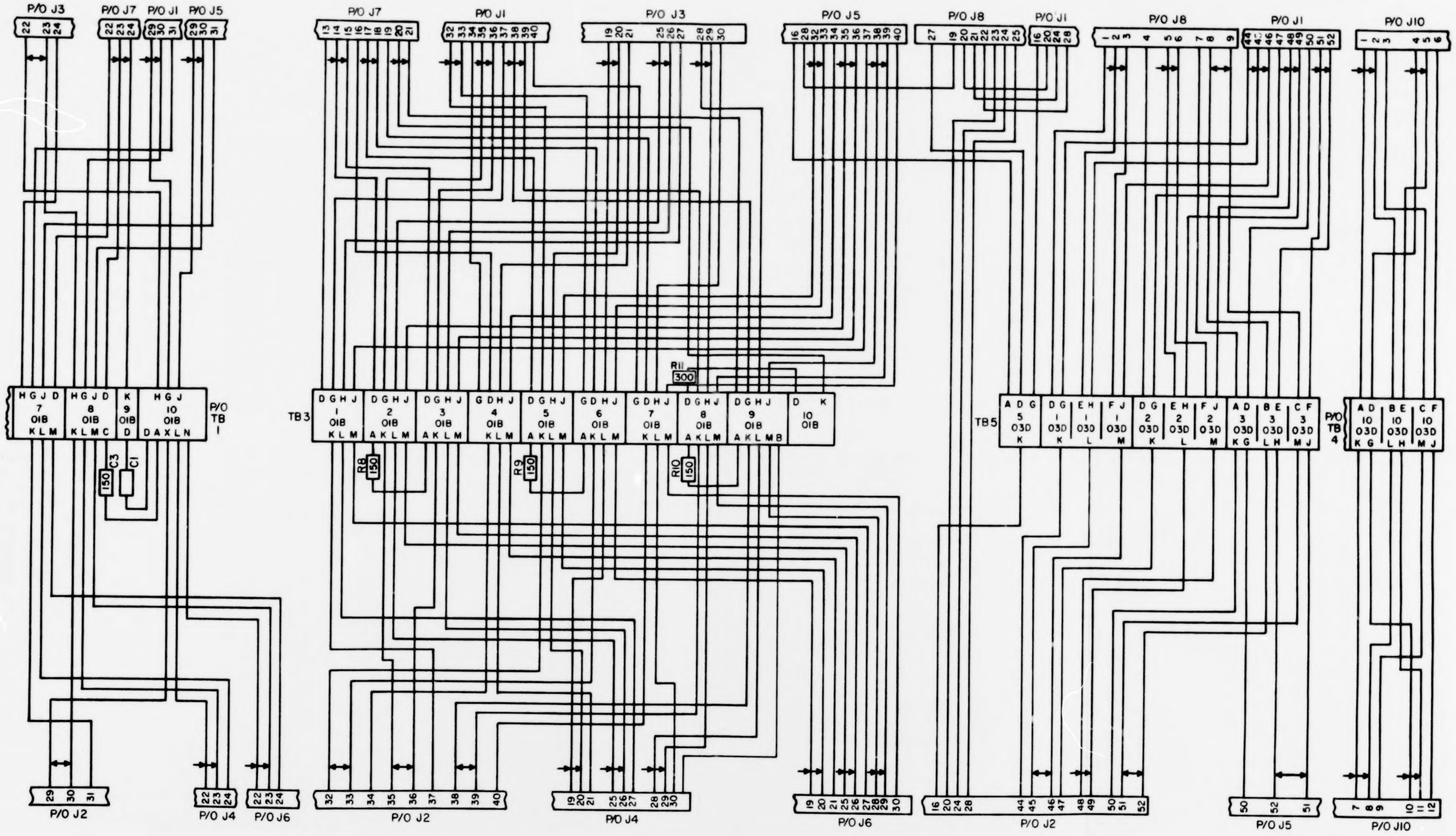
Figure FO-28. Pilot horizontal situation indicator and mode select panel power circuits


COPLT HSI
115 VAC
NO 1 AC BUS
NO 1 PDP
5
066CB4
COPLT HSI
26 VAC
NO 1 INSTR BUS
NO 1 PDP
5
066CB2
COPLT HSI MODE SEL
28 VDC
NO 1 DC BUS
NO 1 PDP
5
066CB6
W550-129-22
W550-132-22
W550-130-22
P/O
300P2
34
25
35
W645-258-22RED
W645-269-22RED
P/O COPILOT
HORIZONTAL SITUATION
INDICATOR ID-2103
P/O
066P2
T1
HDG FLAG
HI
HDG
LO
65
64
68
69
HEADING
SYNCHRO
W357-445-22RED
W557-909-22BLU
W557-413-22RED
W557-908-22BLU
P/O
300P58
33
52
25
24
W645-GD335A22NBLU
W645-81-22RED
W645-GD356A22NBLU
P/O
300P58
34
53
W645-GD008B22NBLU
W557-446-22RED
W557-910-22BLU
P/O
066P7
47
48
P/O COPILOT MODE
SELECT PANEL
TO MODE
SELECT
SWITCHES

NOTES:
▭ INDICATES EQUIPMENT MARKINGS

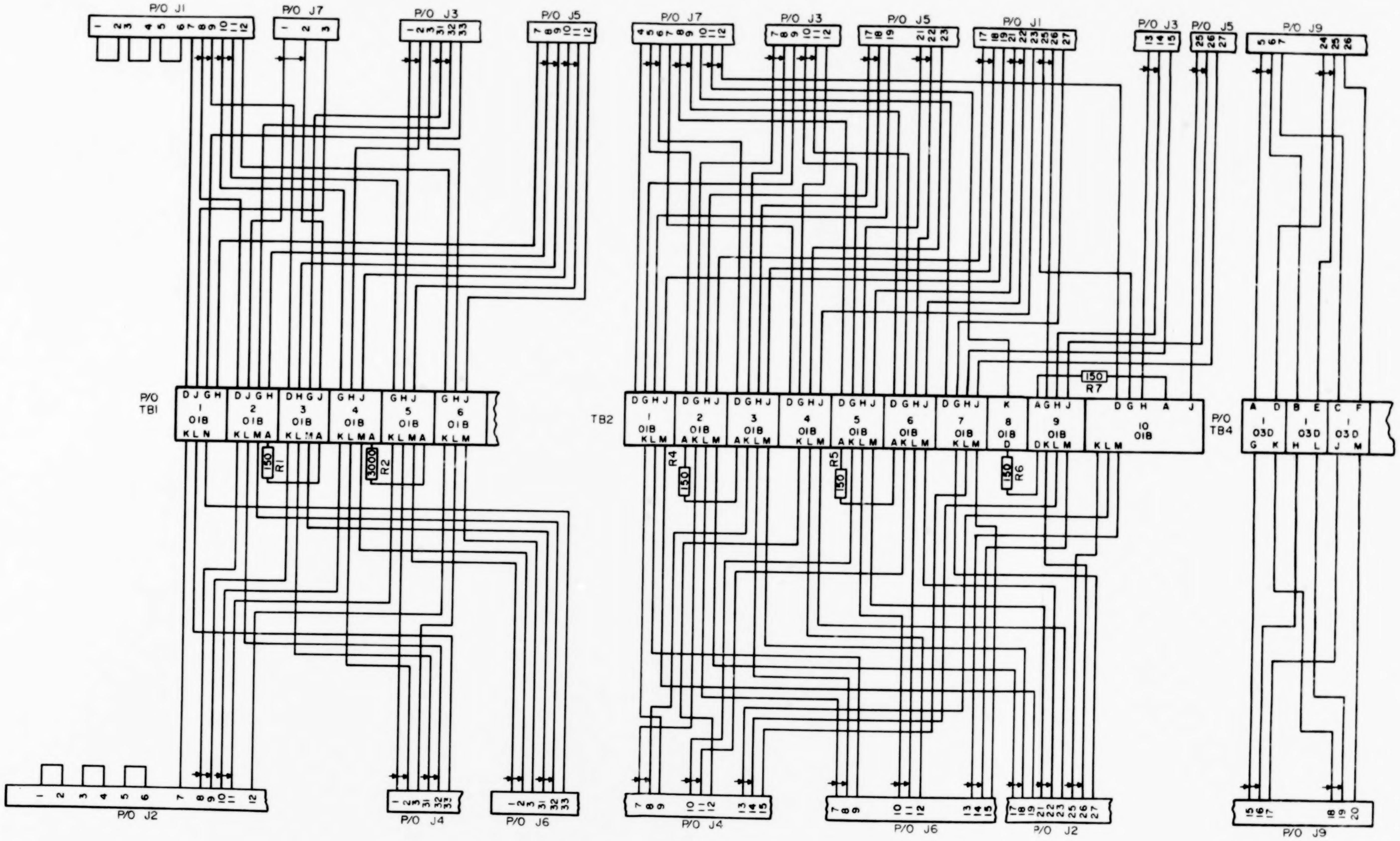
EL8PH030

Figure FO-29. Copilot horizontal situation indicator and mode select panel power circuits


P/O J3
P/O J7
P/O J1
P/O J5
P/O J7
P/O J1
P/O J3
P/O J5
P/O J8
P/O J1
P/O J8
P/O J1
P/O J10
P/O TB 1
TB3
TB5
P/O TB 4
R11 300
R8 150
R9 150
R10 150
C3 150
C1
P/O J2
P/O J4
P/O J6
P/O J2
P/O J4
P/O J6
P/O J2
P/O J5
P/O J10

EL8PH033

Figure FO-30. Interphone junction box wiring diagram (Sheet 1 of 2)


P/O J1
P/O J7
P/O J3
P/O J5
P/O J7
P/O J3
P/O J5
P/O J1
P/O J3
P/O J5
P/O J9
P/O TB1
TB2
P/O TB4
150
R7
150
R1
3000
R2
R4
150
R5
150
150
R6
01B
03D
P/O J2
P/O J4
P/O J6
P/O J4
P/O J6
P/O J2
P/O J9

EL8PH034

Figure FO-30. Interphone junction box wiring diagram (Sheet 2 of 2)

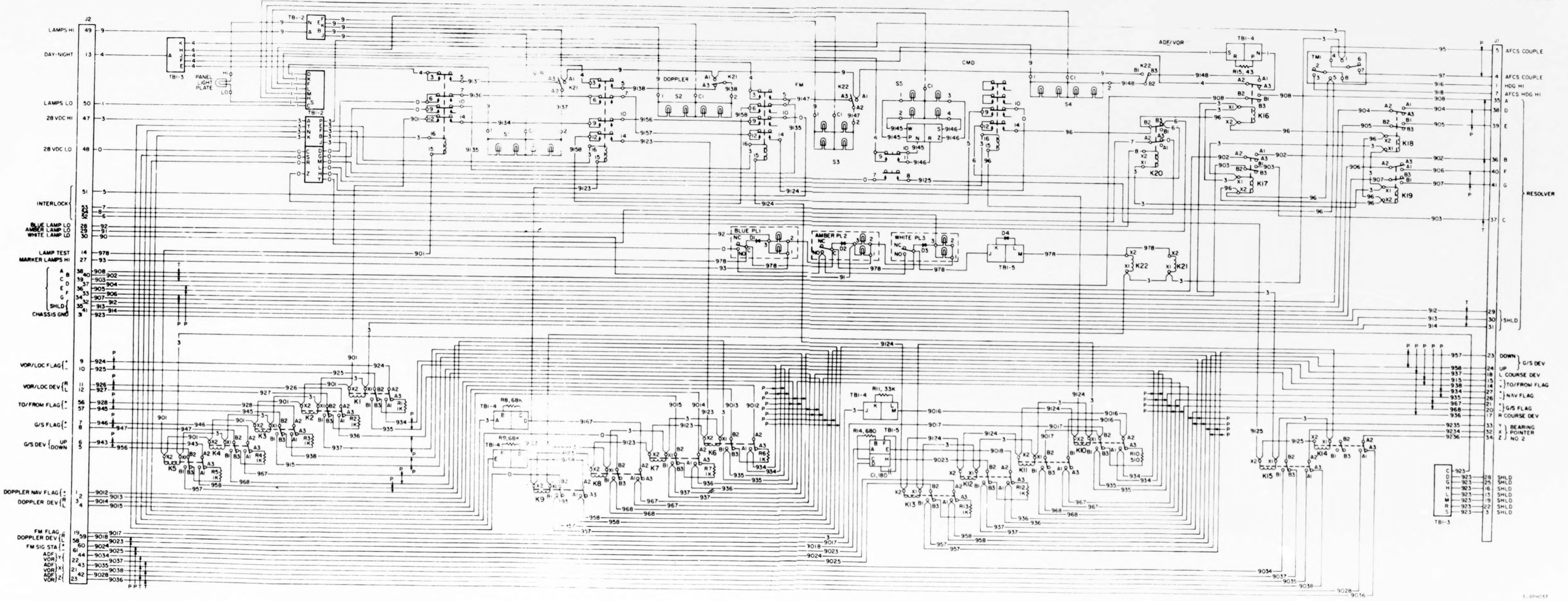

J2
LAMPS HI
DAY-NIGHT
LAMPS LO
28 VDC HI
28 VDC LO
INTERLOCK
BLUE LAMP LO
AMBER LAMP LO
WHITE LAMP LO
LAMP TEST
MARKER LAMPS HI
SHLD
CHASSIS GND
VOR/LOC FLAG
VOR/LOC DEV
TO/FROM FLAG
G/S FLAG
G/S DEV UP DOWN
DOPPLER NAV FLAG
DOPPLER DEV
FM FLAG
DOPPLER DEV
FM SIG STA
ADF
VOR
TB1-3
TB1-2
PANEL LIGHT PLATE
V/R
DOPPLER
FM
CMD
ADF/VOR
S1
S2
S3
S4
S5
K1
K2
K3
K4
K5
K6
K7
K8
K9
K10
K11
K12
K13
K14
K15
K16
K17
K18
K19
K20
K21
K22
BLUE PL1
AMBER PL2
WHITE PL3
D4
TB1-4
TB1-5
R8, 68K
R9, 68K
R11, 33K
R14, 680
C1, 180
R15, 43
TM1
J1
AFCS COUPLE
AFCS COUPLE
HDG HI
AFCS HDG HI
RESOLVER
SHLD
DOWN
UP
G/S DEV
L COURSE DEV
TO/FROM FLAG
NAV FLAG
G/S FLAG
R COURSE DEV
BEARING POINTER NO. 2
TL8PH037

Figure FO-31. Hsi mode select panel wiring diagram